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TRANSACTIONS

OF THE

BROOKLYN PATHOLOGICAL SOCIETY

SESSION OF 1885–'6

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TRANSACTIONS

OF THE

BROOKLYN PATHOLOGICAL SOCIETY.

Meeting of September 24, 1885.

The President, Dr. B. F. WESTBROOK, in the Chair;
Dr. A. H. P. LEUF, Secretary.

Œdema of the Glottis; Tracheotomy; Death.—Dr. J. C. BOWKER read the history of the case, in behalf of Dr. O. A. GORDON, who was absent.

"Thomas T., aged fifty, a laborer, strong and well nourished, applied for admission to St. Mary's Hospital, September 2d, at about 5 P. M. He said he had suffered from a sore throat for about a week and had been unable to swallow much solid food for two days. He was quite hoarse, and unable to open his mouth more than three fourths of an inch, making an examination of the larynx very difficult. There was quite a marked enlargement in the left submaxillary region. The temperature and pulse were about normal. He was sent to the ward and an external application of iodine was made. When I made the evening rounds the patient was walking about the ward in conversation with other patients. I advised him to go to bed, intending to make a more careful examination in the morning. At about 8.30 the same evening the orderly rushed into my room and said the patient was choking. I hastened to the ward and found him gasping for breath and very cyanotic. I tried to pass my finger into his larynx. Failing in that, I opened the trachea at once without dissection and dilated the opening with a forceps until the tube was inserted. Although the operation was done as quickly as possible, the man had ceased to breathe before its completion, and persistent efforts at artificial respiration failed to revive him.

"The autopsy, made by Dr. Leuf, the pathologist, revealed marked œdema of the glottis, the whole mucous membrane above the vocal bands being involved. There was quite a large abscess situated in the left ton-

sillar region. The heart was filled with venous blood, and the lungs were emphysematous. There was cerebral œdema. The other organs were found to be normal."

Dr. WACKERHAGEN asked if there had been profuse hæmorrhage.

Dr. READ wished to know the cause of death.

Dr. BOWKER replied that death had resulted from asphyxia.

Dr. LEUF stated that he had found no blood in the trachea or bronchi.

The PRESIDENT desired to learn if there had been any brain symptoms.

Dr. BOWKER answered that there had not been, and that the patient had been in the hospital only a few hours when he died.

Dr. BURGE called attention to the difficulty of examining the throat, from fixation of the jaw on account of the swelling in the tonsillar region.

Strangulated Femoral Hernia in the Male.—Dr. A. H. P. LEUF presented a specimen that he had removed from the left side. The constricting ring was about 1·25 ctm. in diameter and adherent to the gut passing through it. About 8 ctm. of the ileum had passed the ring, remaining incarcerated behind the saphenous opening. The patient had been sick seven or eight days. His trouble began with obstipation. At first there was no pain, but afterward he complained of pain in the epigastrium, close to the ensiform cartilage. Cathartics and enemata were given, and subsequently he was dosed with opium to relieve pain. At no time did he have any uneasiness below the umbilicus. Intestinal obstruction was diagnosticated by the attending physician, Dr. Irish, and both groins were examined several times. The patient always made contemptuous objections to these investigations, because he referred all his trouble elsewhere and considered the doctor fanciful. Dr. Watt was called in consultation, confirmed the diagnosis, and recommended a continuance of the plan of treatment already adopted. Abdominal incision was not deemed advisable. There was considerable vomiting, and death was due to asthenia. There was no sign of peritonitis at the autopsy except a very few vascular injections of the peritonæum in the neighborhood of the ring. The extruded gut was darker in color than the remainder, but by no means gangrenous. All the adhesions at the femoral opening were recent and easily broken down.

Dr. LEUF opened the discussion by stating that the attending physicians, had they operated, would have made the exploratory incision above the umbilicus, near the seat of pain, and he desired to know the opinion of those present about the advisability of extending the cut down to the seat of trouble, or whether it would be better to pass the hand down and free the gut by manipulating it bimanually—*i. e.*, pulling with the inner hand and pushing with the other.

Dr. WALLACE thought that that would depend entirely upon the surgeon.

Dr. WACKERHAGEN said he would have made an exploratory incision below the umbilicus, regardless of the seat of pain.

The following paper was then read:

THE GENERAL PATHOLOGY OF FEVER.

By JOSEPH MERZBACH, M. D., Brooklyn.

Before entering upon the subject of my paper I may be allowed to make a few remarks on the physiological aspect and those modifications of temperature which we are accustomed to consider as normal.

Heat is the result of molecular motion, and temperature the expression of the velocity of this motion. The three factors on which the action of the relatively constant temperature of the human body is dependent are: the production of heat, the loss of heat, and the regulation of heat. Lavoisier was the first to pronounce the production of heat a process of oxidation—viz., a combination of oxygen in the air with the carbonic acid of the blood. All the later researches in this direction go to show that the greater part of the heat produced in the human body is brought about by this process, and that this process takes place in the tissues themselves and not in the lungs, as was believed by older physiologists. But where the amount of heat comes from not accounted for by oxidation has as yet not been determined.

This production of heat is counterbalanced by the constant loss of heat. Heat is lost by the introduction of air and food of a lower temperature than that of the body, by the evaporation of water from the surface of the lungs and skin, and by conduction and radiation of heat from the skin, as long as the temperature of the skin is higher than that of the surrounding atmosphere. Of these three agents, the skin is by far the most important, giving off eighty per cent. of the whole amount of heat produced in twenty-four hours; the lungs dispose of about eighteen per cent., while the remaining two per cent. is required for the heating of food.

This paramount position of the skin among the heat-losing organs, and its relation to the temperature of the surrounding atmosphere, ought not be lost sight of in the treatment of febrile disorders. I am very much inclined to ascribe the favorable results of out-door treatment in fevers more to the lower temperature and greater motion of the air, by which the skin is enabled to give off steadily quite a considerable amount of heat, than to the better quality of the atmosphere, although, as a matter of course, I am not prepared to deny the beneficial effect of the latter agent.

After having thus briefly touched upon the subject of production of heat and loss of heat, the question naturally arises: What is the

arrangement by which the organism is enabled, even under very considerable variations of the surrounding temperature, to almost constantly maintain its own heat? There are several contrivances by which this object is accomplished, the most evident of which is probably the skin and the regulation taking place by the elasticity of the cutaneous capillaries. If the surrounding atmosphere is cold, the vessels contract, the difference between the temperature of the skin and atmosphere is lessened, and, consequently, the loss of heat is diminished. When the skin comes in contact with warm air, the cutaneous capillaries expand, the difference between the surrounding and internal temperature increases, and the loss of heat becomes greater. It must also be taken into consideration that in the first case the amount of blood exposed to the cooling influence of the air, and the action of the perspiratory glands, is less, while in the latter case it is greater, the supposition being in both cases that the temperature of the atmosphere is below that of the body.

By change of clothing the human being contributes toward regulation from the skin.

Another agent of regulation is the spontaneous increase or decrease of heat-production by change of food; the influence of this agent can not be proved for short spaces of time. In regard to longer periods, we find, as a matter of fact, that the inhabitants of colder climates not only take a larger amount of food than those of warmer regions, but also that they favor such articles of food as are likely to produce more heat. That the respiratory activity varies in different temperatures is generally conceded, while the share of the nervous system in the regulation of heat is still subject to much discussion. It is a matter of course that the nervous system, by its influence on the blood-vessels, must contribute toward regulating heat; but whether it has a more direct action is the question. The direct action undoubtedly takes place in muscles and glands; in these heat is generated on exciting their nerves, even after circulation in them is entirely stopped. But for all the other tissues of the body the influence of the nervous system could not be proved.

The existence of special caloric centers has not been experimentally demonstrated. All the experiments necessary for the removal of the nerve-centers so deeply affect the organism that the resulting changes in temperature may just as well be ascribed to the influence of the operation as to the absence of the nerve-centers. And yet there are clinical facts which, without the admission of such caloric centers, are difficult, if not impossible, of explanation. I have

at present a man under observation who, four months ago, had an apoplectic stroke. The most annoying symptoms which remained therefrom till now are the following: A defect of vision on one side, slightly diminished memory, and cold feet. The symptom last mentioned can not be explained by a lesser degree of mental or muscular activity, because the man is just as energetic and active as before. It also can not be traced to a lesser amount of food, because his nourishment is of the same quantity and quality as formerly. It therefore seems rational to suppose, in this case at least, that the cerebral injury has involved special caloric centers.

After thus having called your attention to the three factors essential to the maintenance of the relatively constant temperature of the human body, let me briefly review some of the conditions which normally modify its constancy. Age produces variations in this way: that the temperature, which immediately after birth is 99·5° to 100°, falls after the first bath to 98·6°, to rise again to about 99°. It then gradually falls one per cent. up to the age of fifty. Between fifty and sixty it remains constant, to rise again, so that at the age of eighty the temperature equals that of the new-born.

Sex has no perceptible influence.

The diurnal deviations are from 97·2°, at 5 to 6 o'clock, to 98·9° between 5 and 7 o'clock P. M.

The influence of food is not considerable enough to attract our special attention. It may be said, though, that the fall of temperature as the result of cold drinks is somewhat more considerable than the rise produced by hot ingesta. Alcohol, even in moderate doses, reduces temperature, probably as the result of a greater loss of heat through changed circulation.

Muscular exercise may cause a rise of from ·5° to nearly 2°. The abnormally high temperature of tetanus is certainly not due alone to muscular work, but also to the underlying pathological condition, and possibly to a narrowing of the capillaries, by which the loss of heat is diminished.

Mental work influences temperature but slightly, at least in our climate; in tropical countries a rise of 2° has been observed. In modification of this statement I must remark that the president of this society, Dr. B. F. Westbrook, succeeded, by great mental concentration, in producing a rise of 2°; I myself was not able to increase my temperature by mental work more than 0·4°.

The surrounding atmosphere has no remarkable influence as long as the mode of living, food, and clothing are appropriate; these

being defective, very low temperatures may produce a fall of heat sufficient to cause death. Very high temperatures can be borne to a remarkable degree in a dry atmosphere. The danger of sunstroke is greater, of course, in a saturated atmosphere and with muscular exertion.

Normal menstruation and pregnancy do not influence the bodily heat; the higher temperature of the pregnant uterus is partly due to the fœtal production of heat, partly to the great muscular development of the organ. After delivery, the temperature rises almost invariably, and we all know how difficult it is to fix a boundary between normal and abnormal; and it will always be necessary for the formation of a correct judgment not to rely upon the thermometer alone, but to take all the concomitant circumstances into consideration. The influence of refrigeration on the temperature of the body, in the present state of therapeutics in fever, requires mentioning. The first effect of cold applications—and an effect more marked in proportion to the extent and intensity of the application—is a slight rise of the axillary with a fall of peripheral and rectal temperature, while the continuance will change the axillary increase into a decrease, and will force still lower down the peripheral and rectal temperature. The difference of behavior between the axillary temperature and that of other regions has been explained by Liebermeister through a relation between heat-production and loss of heat. He holds, and seemingly proved by calorimetric researches, that the production of heat increases in proportion to the loss, and that, as long as the loss of heat does not take on an extent which can not be antagonized by increased heat-production, the internal temperature will be higher in proportion to the lowering of peripheral heat. This explanation was based on experiments which with other observers did not by any means yield identical results; and besides that it does not agree with the fact that the temperature in the rectum, and even in the vena cava inferior (Ackermann), declines at once as the result of refrigeration. The axillary rise has so far not found a satisfactory explanation; the most plausible theory is that the only vaso-motor nerves not subject to the irritating influence of refrigeration are those governing the muscular blood-supply, and that these, instead of producing contraction, allow their blood-vessels to expand under the increased blood-pressure; therefore the temperature of the muscular tissues which is found in the axilla rises, while the peripheral and internal temperatures decline. Whichever theory may be right, there is a general agreement about the clinical fact

(and this is of paramount importance to us) that the general temperature of the body declines after a more or less continued application of external cold.

Great reduction of temperature is also brought about by considerable losses of blood and the injection of gases into the abdominal cavity. I need not go into the *modus operandi* thereof, as the subject of my paper gives me more interest in the exploration of the causes which produce high temperature. Elevation of temperature is the only symptom which is common to all fevers, and we may therefore define fever as a general disturbance of the system, the pathognomonic sign of which is an increased temperature. Hence the Latin "febris," from "ferveo," I am warm, and the Greek "pyrexia," from πῦρ, πυρός, the fire. All the other symptoms—as dryness of the skin, increased action of the heart, change of secretions, chills, nausea, and thirst—may be absent. On the other hand, headache, pains in the back, and a feeling of fatigue, which we so commonly find in fevers, may be present in other conditions of the system which lack an elevation of temperature. Therefore I think we are justified in designating the elevation of temperature as the only sign by which we are always enabled to make the diagnosis of fever.

The pathogeny of fever has always eminently occupied the minds of medical men, as may be expected from the importance of its position among diseases; and the history of theories on fevers, like that of other diseases, teaches "the imperfection of one pathological view for the explanation of all the symptoms of a given disturbance. According to the prevailing theory of the times, fever has been explained by physical and by chemical processes—by changes in the vascular system, by derangement of the nervous system, by increase or decrease of tissue-irritability," etc.

Even philosophy and religion have been made use of for the explanation of the morbid phenomena of fever; thus I may mention, for the sake of curiosity, that Stahl, according to whom all vital processes were controlled by a single principle—the soul—defined fever as "an almost conscious motor, secretory, and excretory act for the removal of noxious matters." To discuss all the theories mentioned, to give all the arguments in favor of and against every one of them, would lead me too far. I may therefore be allowed to proceed at once to the modern views on the pathology of fever.

That there is at the root of every fever something foreign to the normal blood is generally accepted; it may come from without, as

in infectious diseases, or it may be formed within the organism, as in septic processes. About the nature and character of the disturbing element there are just at present numerous theories. Bacilli, fungi, bacteria, and micrococci are discovered one day, to be mercilessly murdered the next. We may safely say that, with very few exceptions, the microscope thus far has failed to demonstrate the entity and the differential character of the modern microphytes so as to insure their general acknowledgment. We are therefore compelled to leave this question, and we now ask in what way does the disturbing element affect the system?

Is the blood but the carrier of these little organisms, which, upon their arrival in the tissues, modify metamorphosis? Or does the presence of these elements cause an intermediate product in the blood which irritates the tissues? Furthermore, does the disturbing element act on the tissues directly or by the intervention of the nervous system? And, if the nervous system is responsible, is the central nervous system directly irritated by the foreign element carried to it by the blood? Or has the disturbance primarily acted on peripheral nerves, whence the irritation is communicated to the central nervous system?

All the attempts to answer these questions have so far been resultless, and all the theories which take for their foundation either blood, or tissues, or peripheral nerves, or the central nervous system, have been refuted, notwithstanding the able advocates they found. It seems highly probable, therefore, that all these organs have their share in the primary causation of fever, and that the greater or lesser extent to which their share in a special case is limited depends on the nature and character of the disturbing element. In other words, I do believe that every attempt at the pathological generalization of fevers will be futile, and that, for the explanation of all the symptoms of a given case, it will be necessary to determine more accurately the special and differential character of the disturbing cause.

For an explanation of the most prominent phenomena we must go back to our three great factors in animal heat—viz., heat-production, loss of heat, and regulation of heat.

That heat-production is increased in fever may be admitted as generally conceded; also that the process of combustion extends more to nitrogenous than non-nitrogenous substances. Of course, this factor alone can not be held responsible for the causation of an increased temperature, because then we should have elevation of temperature in all conditions of the system where combustion is in-

creased—for instance, after meals. That this is not the case was shown in my remarks on the normal modifications of heat. Traube's theory, by which he explained the phenomena of fever by diminished loss of heat, is opposed by the following considerations: It has not been proved that the contraction of the small arteries precedes the other phenomena of fever; it can not, therefore, be asserted that this contraction maintains a causal relation to the rise of temperature. Secondly, were the pyrexia due only to the diminished loss of heat, temperature should under all circumstances fall when the loss of heat is increased. This does not take place in acute rheumatism, puerperal, septic, and hectic fevers.

The theories which place the starting-point of the febrile phenomena in the nervous system alone—whether this be the central nervous system according to Virchow, or the sympathetic system of Claude Bernard, or the trophic nerves of Schiff—have neither been supported by clinical facts nor by experimental physiology. Mr. Teale's remarkable case, in which an injury about the upper part of the spine was followed by a temperature ranging for nine weeks from 109° to 122°, and even to 125°, with recovery, can not be taken as a proof that in all cases of fever the nervous system is at the root of the disturbance. And though I may omit the question of local myelitic inflammation as an agent in causing the febrile movement, this case, in my opinion, proves possibly just the opposite. In no other fever is there such a tolerance of an enormously high temperature, and, if in the great majority of cases even much lower temperatures become fatal after a shorter time, this shows that there must be other factors in play.

No one of these factors, therefore, sufficiently explains by itself the pathogeny and semeiology of fever; it remains to be supposed that either two or all three of these factors are combined. The facts only justify us in the assumption that during fever heat-production is moderately and constantly increased, while there is an impaired action of the skin by which the loss of heat is diminished. The share of the nervous system has to be stated as being obscure till experimental physiology sheds a more satisfactory light on the relation between the phenomena of normal animal heat and the nervous system.

There are certain symptoms pretty constant in all fevers which require our attention. Of course, the chill is one of the most interesting of them, but, like so many other interesting phenomena in medicine, difficult of explanation. It consists of a diminution of the

peripheral temperature, with a rise of the internal temperature, which occasionally attains its maximum at the termination of the chill, more frequently in the subsequent hot stage.

The fluctuations of temperature are, as is well known, of a different type in different fevers, and therefore can not be subject to general laws. The different types—as intermittent, remittent, continuous, and ephemeral, and the reasons for this nomenclature—are so well known that their enumeration may be sufficient. The division into febricula, pyrexia, and hyperpyrexia is useless, because of the difference in the subjective view of the observer.

The influence of fever on the pulse will not only vary with the degree of temperature and the time the organism is exposed to the influence of a high temperature, but also with the cause producing the fever. The pulse will nearly always be accelerated; in the beginning it is hard and full, and becomes smaller and softer in proportion to the intensity and the duration of the disease.

The blood is not altered so much during the fever as was formerly believed. The relative proportion of hæmoglobin and red blood-corpuscles to the mass of blood is only slightly diminished. In the lytic or epicritic period this diminution is considerable.

The carbonic acid given off by the lungs is increased in the proportion of eight to seven of the normal evolution. That the respirations are increased in fever is well known; in attempting to explain this fact we again meet the dilemma, Is this due only to the increased temperature, or also to nervous influence?

The urine is, during pyrexia, most frequently smaller in quantity, dark colored, and shows the following chemical changes:

The relative amount of phosphoric acid is diminished; we know that in certain conditions of chronic irritation the brain is relatively richer in mineral substances than normally; it is possible that the acutely irritated condition during fever depends on the same cause. Chlorate of potassium is present in moderate quantities, and chlorate of sodium in small amount. In opposition to former opinions, more recent researches have shown that urea is not increased to a great extent, while the uric acid and ammonia are present in greater quantities than normally. While this shows that the combustion of albuminous substances is increased, it also demonstrates that the process of disintegration is of such a nature as to prevent the formation of the normal terminal product. Albumin we only find in very intense fever, and the albuminuria may be due partly to altered conditions of the blood-pressure, partly to the parenchyma-

tous degeneration of the kidneys, partly to an altered diffusion of albuminoids, and possibly to nervous influences.

Of other secretions, that of the salivary glands has been examined. It is diminished in quantity, sometimes absent altogether; its reaction is acid, although a free acid has not been determined as yet. In connection with the parotid gland, the suggestion of Mosler, to introduce a cannula into Stenson's duct for the removal of obstructions, is well worth mentioning, because in this way the post-febrile inflammation of the parotid may be prevented or its occurrence diminished.

There is a marked degree of dryness of the buccal and pharyngeal glands, and in almost all fevers we find a buccal and pharyngeal catarrh, by which the excessive thirst is better explained than by the so-called febrile desiccation. That there is a most intimate connection between the dryness of the buccal and pharyngeal mucous membranes and high temperature is shown by the moist state of the tongue after severe hæmorrhages and subsequent collapse in typhoid fever. The increase in thirst and consumption of water, with the diminution of the secretions, naturally lead to the question, What becomes of the water? It has been claimed that it becomes latent in the body during the fever, to be removed from it by the critical discharges. In support of this view, it has been said that the face of the patient during pyrexia looks turgid, while during the period of convalescence the countenance looks most emaciated; besides, that the blood of the fever patient was supposed to be richer in water than that of the normal system. The last point has not been demonstrated with sufficient exactness and conclusiveness to be taken as a proof. In order to settle the question satisfactorily, it will be necessary, in comparing healthy individuals with fever patients, to measure, besides the water in liquid form, the exact amount of liquid the normal individual takes in in the shape of solid food—as vegetables, etc.; furthermore, the increase in the amount of insensible perspiration and exhalation from lung and skin has to be calculated more accurately than has been done hitherto.

The anatomical changes which embrace the liver, kidney, spleen, pancreas, the heart muscle, blood-vessels, and the voluntary muscles, are only to be found after some duration of a high temperature. The parenchymatous degenerations of the liver and kidneys are easily explained by the high temperature and perverted innervation; in the kidneys the irritating character of the substances to be secreted may be of influence.

The heart muscle becomes very soft and pigmented, being filled with fat granules and brown pigment granules. The walls of the smaller blood-vessels often undergo fatty degeneration (thence tendency to capillary hæmorrhages); in the larger vessels the intima is swollen. In the voluntary muscles we find two kinds of degeneration: the fatty and amyloid. It need hardly be mentioned that the latter does not allow of restitution. The spleen is enlarged; in the beginning it is hard and tense, while in the further course of fever it becomes softer and more friable; whether the general anæmia corresponding with the enlargement of the spleen is due to the circumstances that this organ deprives the other tissues of a great amount of blood, or whether it is due to a specific action of the spleen in the formation of blood-corpuscles, can not in the present state of physiology be decided.

The symptoms connected with the digestive tract are not always due to a gastro-enteritis, which, with some pathologists, plays such an important part. The anorexia, constipation, nausea, etc., can easily be explained by a lesser activity of the glands and by faulty innervation. Inflammation would not be so quickly removed as to allow appetite and digestive power to come back to their normal standard immediately after the cessation of the high temperature. I do not wish to assert that the influence of high temperature, unduly prolonged, may not be capable of producing inflammatory lesions of the stomach and intestines, but I do not believe in their constant presence in fever.

The functional derangements consist of a disturbance of general sensation and of psychical and motory functions. The ways in which these disturbances manifest themselves to the observer are so well known that they do not require special enumeration.

This completes the symptoms and phenomena which are more or less constant in all fevers; special lesions and their modifying influence on the course of the fever, as the intestinal lesion in typhoid fever or the skin lesion of variola, must be left to the consideration of special pathology.

Dr. Eccles could scarcely agree with the essayist in the statement that mental work had but little effect upon bodily temperature. Ordinary thinking might show a meager effect, but intense mental excitement would cause marked elevation. In conditions of terror or apprehension, when there was a tornado of thought, it was no unusual thing for the person affected to break out in profuse perspiration. Elevated temperature meant increased oxidation or diminished radiation. A check of per-

spiration might give rise to elevation of temperature. The act of perspiring did not lower temperature. It was work done in evaporation at the expense of bodily heat. Conduction also aided in keeping down temperature. The irritating presence of non-excreted waste products might constitute a factor in causing fever. In most febrile conditions there was a sort of diffuse inflammation in which the whole system took part. Apart from the action of specific heat-centers, or even without nerve control, every cell might become an independent heat-producer. To the physiological psychologist attention was the subjective side of coordinating force, and might be expected to have some bearing upon a subject of this kind. When attention was turned upon the feeling that arose from any particular organ there were congestion and increased heat of that organ. A boy at play might forget that he had a stomach until he thought of food, when all of a sudden he became hungry. This was true of every function having a special sensation connected with it. A soldier might be severely wounded and the injured part bleed but slightly while terror and duty commanded his attention, but, so soon as these ceased and he considered the pain, profuse hæmorrhage would set in. The pain was the subjective side of the wound. Attention turned upon the pain meant that the highest nervous control of the body discharged its energy toward the source of that pain. *Dis-ease* was a disturbance of our feeling of well-being. The concentration of attention during health upon this feeling maintained it. When much of our body or the whole body became irritated from any cause, energy went forth to every disturbed part from the highest centers. Along the path whence the discomfort came the return-current would go as soon as attention was turned thither. Thus every heat-producing part might be released and a sort of physiological anarchy ensue. The essayist had made no reference to the reduction and elevation of temperature by therapeutic agents, a phase of the subject well worth considering. Antipyrine lowered temperature and the salicylates elevated it. Many other agents acted in one or other of these two ways.

Dr. Leuf had frequently noticed upon himself the effect of excitement due to overwork in causing a feverish feeling. He had never measured his temperature with a thermometer, but could give an idea of the increase of his bodily heat by stating that he had again and again taken seven to ten, or even more, goblets of ice-water during an evening, and all within two hours (from 9 till 11); and during this time he would suffer with throbbing of the temples, tension of the head and face, sometimes *tinnitus aurium*, a dry, parched tongue and lips—in fact, the tongue sometimes being actually painful. These symptoms invariably followed concentrated and continued mental effort. Still he could not imagine with Dr. Eccles that mental concentration would account for all rises of bodily temperature, if only for the reason that so many imbeciles, idiots, and children had fever. In cholera, for instance, there was the greatest mental apathy, and yet a marked rise in the body-heat. The

increased work done by the body in perspiring could not be adduced as a general explanation of the reduction of high temperatures, for there was in some conditions a very high degree of fever, with profuse perspiration, continuing for days. Oiling the body also lowered the temperature when it was above the normal, but not in all cases. There was a reduction resulting from a cutaneous application and without resulting evaporation. He would also object to calling a fever a "diffuse inflammation in which the whole system took part," because that would be impossible with the present use of the word inflammation. He agreed with the reader fully in the thought he had intended to express, but objected to the words used.

Dr. ECCLES replied that while children or idiots might not be able to do any complex thinking, they were subjects of terror and endurers of pain. On these simple sensations they could center their attention with considerable persistence.

The PRESIDENT asked if Dr. Leuf had ever reduced excessive temperature by oiling the skin?

Dr. LEUF rejoined that he had, and that too when the efficacy of the method could hardly be questioned. In these instances it had been employed either without the use of drugs or conjoined with placebos. He also replied to a previous question by the president, that he believed the efficacy of oiling was due to its lessening heat-production. This, it seemed to him, it did in two ways. It quieted the nervous system, like the chloral Dr. Read used in his cases; and it relieved the intense irritability and dryness of the skin by making it soft and pliable, and avoiding a great deal of friction. He believed that the one great, ever-essential factor in increased heat-production was a certain disturbance or varying set of disturbances in the visceral sympathetics, especially those of the abdomen. Here were located the centers of heat, and they generated this in superabundance in proportion as they increased their activity. Their activity was presided over and depended upon the visceral sympathetic. As everybody knew, the thoracico-abdominal sympathetic ganglia were connected with the outer skin by means of their numerous double connections with the spinal nerves. It seemed, then, that oiling the skin also allayed irritability of these ganglionic centers, causing them to act with more control in regulating the work of the trunk viscera—the heat centers.

Dr. J. D. SULLIVAN stated it as his belief that fever was a disturbance of nutrition due to the nervous system. The waste in fever must be due to an arrest of nutrition. He put the question, whether the delirium in fever was the result of increased heat, of a poison, of an arrest of nutrition, or of a condition of the brain. He believed it was caused by changed conditions of the brain. He then illustrated by citing instances from his personal experience, when during an attack of fever he had imagined occurrences which to this day seemed to him as real as anything he knew, so that he had only become convinced of his mistake upon the positive assurance from reliable sources that he was wrong.

Dr. ECCLES replied that he could take no mental grip upon the words of the last speaker. To say that defective nutrition caused fever gave no idea of the *modus operandi.* If it could be shown that this defect in any way increased oxidation or retarded the elimination of heat already produced, it would be an acceptable hypothesis. As to the delirium of fever, a few simple experiments, such as he had tried, would cast much light upon its genesis. During the time our attention was centered upon the delightful feeling of comfort experienced when about to drop into sleep, if we divided that attention, delirium of a mild type might be produced artificially and studied by introspection. "Try to catch yourself going to sleep," he said, "and an *alter ego* will arise with whom most incongruous conversations may occur, and ideas quite foreign to the purely waking state will intrude themselves. While you are yet awake, absurd dreams will come up in your consciousness, and you will be quite aware of their absurdity. It is the result of divided attention—unconscious cerebration in this way pushes itself within the door of consciousness." Even in our waking state it often happened that we did and said irrational things if our attention was divided. The unfortunate occurrence that had happened to Mr. Am Ende, the Hoboken apothecary, in which morphine was substituted for quinine, was probably one of those quasi-delirious acts of a man with divided attention. It would not have been beyond possibility for such a thing to occur, and he know that a blunder was being committed, and yet feel powerless to arrest it. In the delirium of fever, currents of discomfort reached the highest nerve-centers from every direction. All these were subjectively perceived and the attention was distracted among them. Active cerebration resulted from them in the most disorderly manner. Attention allowed this chaos to intrude on consciousness.

Dr. SULLIVAN rejoined that, if it was possible to explain nutrition by chemical or philosophical means, he might be able to explain how its arrest caused fever.

The PRESIDENT remarked that Dr. Eccles and Dr. Sullivan viewed the question regarding temperature elevation from opposite standpoints. The former looked at it as a physicist, the latter as a vitalist.

Dr. H. N. READ would speak only on the influence of the nervous system on the temperature of ephemeral fevers in children. He had one case in mind that had shown this beautifully. A young infant suddenly became ill. There were no other disturbances than those common to fever. The temperature was 103° or 104° F. He gave chloral to control excessive irritability and the convulsions—*i. e.*, to reduce the nervous tension. After several hours the child was in a normal condition. Such cases were quite frequently met with, and the patients were well within from six to twenty-four hours after the administration of a nervous sedative. Often there was not even constipation. He believed that, if the proper apparatus was at hand to weigh these children before and after the attack, there would be found a diminution of weight from

superoxidation. He thought that in these cases the fever was brought about by a change in metabolism due to insufficient nervous control.

Dr. LEUF remarked that the softening of viscera accompanying fever was of interest and worthy of consideration. He had noticed that the softening did not necessarily depend upon the length or severity of the fever. He had not examined these organs very often with the microscope, but they always had a fatty appearance. He thought the change in consistence was due to fatty infiltrations and degenerations, because they were always soft, pale, and greasy. In his experience, the heart had seemed most frequently affected, and after that the kidneys and liver. The kidneys were often so soft that they could easily be doubled over and made to touch end to end, and this too without cracking or fissuring, while the capsule was off. When the spleen was in that condition, it was very mushy and had a dirty pale-gray color. The capsule was, as a rule, wrinkled. The pancreas was also quite often in a similar condition, and, when so soft, had almost the same grayish color, but with a slightly yellowish tinge. He had simply expressed himself on this point because there were many who did not consider these changes fatty, and who denied that fever was the causative agent.

Dr. MERZBACH said, in answer to some of Dr. Eccles's remarks, that, as regarded the function of the skin, he had stated in his paper that it reduced the temperature in several ways, the most important of which was evaporation, then conduction, etc. The theory which gave the mind so much importance in the increase of body-heat he did not credit much. He had also seen very severe hæmorrhage from patients during anæsthesia and in other unconscious conditions, and supposed that everybody else had also. He could not see how arrest of nutrition would cause fever, but it certainly was a concomitant. It was well established that the nitrogenous elements were burned in greater proportions than other tissue elements were, as was shown in the increased amounts of urea passed through the kidneys. All of this waste was not accounted for by the burning of nitrogenous substances alone, as observation showed seven per cent. of the total decrease in twenty-four hours not accounted for. Thus the changes in the urine did not represent all the destruction. The cause of delirium might be indicated by the increased amount of phosphoric acid found in the urine. A similar condition was observed in chronic cerebral irritation or neuralgia. He did not think it necessary to suppose some foreign influence to be the cause of delirium. Hot blood might be sufficient cause. There was, for instance, a chronic excitability noticeable in peoples existing in hot climates. We all knew the excitability of the races of the tropics, whether civilized or uncivilized, and he supposed it was possibly due to the continuous irritation of the superheated atmosphere and its effects transmitted for ages from generation to generation.

The PRESIDENT said it was interesting that in fevers of the same height there was a great difference as to the amount or even presence of delirium—for instance, malarial and typhus fevers. Then the exist-

ence of heat-centers was of interest. Dr. Ott had recently shown quite positively that there was a heat-center just anterior to the caudate nucleus. Fever, too, was very often accompanied for days with profuse sweating, although the temperature remained very high.

Dr. ECCLES asked how high the president had noticed the temperature under these conditions.

The PRESIDENT replied that he had seen the thermometer register 106° F. during continuous profuse perspiration, and just after marked sweating in typhoid fever he had seen it 104°; likewise in tuberculosis.

Dr. MERZBACH, in closing the discussion, stated that he had alluded in his paper to the fact that high temperature alone did not always explain delirium, because in different fevers, as had already been stated, when the body-heat was the same, there was a great difference in the degree of delirium. He had not attempted to explain it, because it could not be done. The only way in which he could account for persistent high temperature during perspiration was by supposing the heat-production to be so great that the sweating could not wholly counteract it.

Meeting of October 8, 1885.

The President, Dr. B. F. WESTBROOK, in the Chair;

Dr. A. H. P. LEUF, Secretary.

CEREBRAL ABSCESS FROM A CRANIAL FRACTURE.

BY D. MORRIS WOOLLEY, M. D.,
BROOKLYN.

ON July 30th, about 7 P. M., I was called to attend a boy, fourteen years of age, who had fallen from the roof a two-story-and-basement house. He was then in convulsions. There was considerable tumefaction over the right eye and supra-orbital portion of the frontal bone. There was no laceration of the tissues, and, from the great œdema present, it was impossible to make out any fracture. I immediately applied hot water to the feet, and gave rectal injections of whisky.

In the course of two hours I succeeded in equalizing the circulation and controlling the convulsions. The boy was finally restored to consciousness.

At this time the family physician, who is a homœopathist, came in, and I, of course, surrendered the case to him. But, had it been my case, from what I know of antiseptic surgery, I should not have hesitated in making an exploratory incision in the scalp. However, the boy was treated by this homœopathic physician for about ten days, when the family, becoming dissatisfied, again sent for me. During these ten days, I was informed, the boy had been all the time conscious, with only slight spells of delirium in the evening. It was asserted that he even went to the table and partook of meals with his usual appetite, the principal trouble being considerable pain over the eye, with much more swelling than ever.

I learned that morphine, which had been given him, greatly increased the delirium. The night previous he suffered much from pain. I found a large abscess forming and pointing just above the eye. This was poulticed with flaxseed made with hot lead-and-opium wash, and I ordered potassii bromid., grs. 10; sodii bromid., grs. 10; chloral hydratis, grs. 5, three times a day. As a substitute for morphine, I gave ext. hyoscyamus in pills of two grains each, all of which seemed to act like a charm, giving good sleep. At this time his temperature was only 100°, and he had a full pulse of about 70. His pupils contracted and freely responded to light.

The next day I found him in bed, reading a story with great interest. This I forbade. Curious to say, this boy was remarkably bright and had

an excellent appetite, the only symptom being at times much pain, which increased till his temperature was about 101° and pulse 65, when I made an incision just above the eye, where the abscess seemed to be pointing. I think fully one quarter of a pint of laudable pus came out. The cavity was washed with 1-to-2,000 bichloride-of-mercury solution, a drainage-tube inserted, and the wound dressed antiseptically twice a day. The temperature fell to 99·5° F. A day or so after, another incision was made over the squamous portion of the temporal bone, when the probe detected a depression of bone and an apparent fracture. It was not until we got rid of the pus and probed extensively that anything like a depression or fracture could be made out. I then suggested to the father the necessity of trephining, but, after consulting two or three physicians, it was thought that to wait for further symptoms was the best plan.

For a few days after the incisions were made he had much less pain, and did apparently well, the pulse ranging between 60 and 70, and the temperature under 100°. But the pain returned to the region of the right eye, increasing each day with so much severity that large doses of bromide of potassium and ext. of hyoscyamus failed to produce sleep. Finally, on Saturday, at 5 P. M., August 22d, I for the first time gave, hypodermically, five minims of Magendie's solution of morphine, because for twenty-four hours he had not slept, owing to intense pain. This relieved him and produced sleep. His pulse now was 58, and temperature under 100°. All this time the boy had been intelligent, his pupils responding freely to light. Two hours afterward I found him comatose, with a temperature of 104° and a pulse of about 140. I concluded that he must now be suffering from acute encephalitis due to the burrowing of pus through some fracture of the skull.

I immediately called in Dr. Walter B. Chase, and we gave twenty grains of antipyrine hypodermically and ten grains by the mouth. In less than one hour the temperature fell to about 102°. Next morning the temperature was 100°. In the evening it rose to 102°. At this time we held a consultation, calling in Dr. J. H. Hunt. We decided to trephine on the following morning. We gave chloroform for anæsthesia because least liable to cerebral excitement. After making an incision and dissecting up the scalp we found a stellate fracture of the right frontal bone just above the orbit. In the center of this fracture was a triangular piece of loose bone with one of the angles penetrating the substance of the brain, causing a deep abscess into which you could put your finger. We took this bone out and elevated a portion of the rest. About five hours later the temperature went up to 104°, and it was again shortly afterward reduced to 102° by antipyrine. The next morning, which was Tuesday, the temperature remained the same. In the afternoon there was an elevation to 103°. Gave antipyrine, with some slight return of consciousness, but pupils somewhat dilated. Wednesday morning the temperature was down to 101°, with a good pulse of about 100. In the evening the temperature went up to 102°, with contracted pupils. The next morning it went down

to 100·75°. In the evening there was another marked elevation to 104·25°. At this time there seemed a marked change for the worse; the pupils were more dilated than ever, the breathing was heavy, the pulse 140 and very weak, and the coma more profound.

I injected twenty grains of antipyrine hypodermically, and gave ten grains by the mouth. Shortly after, the temperature fell to 101·5°. He regained some consciousness, speaking in monosyllables. About midnight the temperature was taken by the nurse and found to be slightly subnormal.

On Friday morning the temperature was 101·5°, the pulse good and full, and I was told that the boy recognized those around him and was at times quite conscious. I went again to see him at 2 P. M., and the temperature was up to 104°. Again I gave twenty grains of antipyrine, which by the evening had brought it down to 101·25°, with a good, full pulse.

On Saturday morning the temperature and pulse were the same. In fact, there was no change that day except his being at times slightly conscious, having said to his sister, when annoyed, "Get out!" No antipyrine was required this day. The case now seemed more hopeful—in a word, he was better than any time since the operation, and we felt that nature was going to bring the boy through. But Sunday told a different tale. That morning the temperature was 104°, with a full, rapid pulse. Twenty grains of antipyrine failed to produce any effect, and by evening the fever was raging at 104·5°, with a pulse of 142.

I gave ʒ ss. of antipyrine and applied ice to the wrist. Here I would say that the ice-bag had been continuously applied to the great vessels of the neck ever since the commencing night of the high fever. However, we again, in a few hours, succeeded in bringing the temperature down to 101°, the pupils contracting and responding to light.

On Monday morning at eight o'clock the temperature was 102·75°. I undressed and washed out the wound as usual with 1-to-2,000 bichloride-of-mercury solution. During the last two or three days there seemed to have been more discharge of pus than usual, but presenting a very healthy appearance.

In the evening the temperature was 102·6°. He answered "Yes" to the question "Do you see?" On Tuesday morning the temperature was 103·25°, with a full pulse of 140. Gave twenty grains more of antipyrine. That evening the temperature and pulse were about the same. I repeated the same quantity of antipyrine and reapplied ice to the wrist. I asked him if he felt any pain. He faintly replied, "My eye hurts."

Wednesday morning the temperature was 103·6°. Gave twenty grains of antipyrine. In the evening the temperature went up to 104·8°, the highest point yet reached. Again gave twenty grains more of antipyrine, and the temperature, in less than two hours, fell to 102°, and by twelve o'clock that night it was 101°.

Thursday morning, temperature 103·5°. Left foot cold, while the rest

of the body is warm. Since last night, for the first time, there has been difficulty in swallowing. There is a tremor to the pulse. When the left leg is touched, it causes some distortion of the facial muscles. There is now a greater change and a more anæmic condition of countenance. It looks as though the vital centers were being disturbed. In the evening the temperature was 103·25°. Gave twenty grains of antipyrine, without any effect.

On Friday morning there was still a greater change for the worse. The countenance was that of the Hippocratic expression, the temperature again reaching 105·25°. It did not seem that he could last over two hours, yet his heart was beating well, and, with the vitality present, he might live till night. He died that afternoon about six o'clock. The next day Dr. Hunt and I held an autopsy, but, much to our surprise, found no meningitis except a localized portion around the point of fracture. We found no other changes except a deep abscess which had broken into the right lateral ventricle.

The conclusion which may be drawn from this case is, that this abscess had commenced to form immediately after the perforation of the dura mater, and the irritation caused by the triangular piece of bone, and that perhaps the high fever and sudden coma came after the rupture in the ventricle.

I think there is also one important lesson which may be drawn, and that is, that we are apt to be too conservative at times. It strikes me that, with antiseptic precautions, very little may be lost by trephining while a great deal may be gained. In all probability, had an operation been made immediately after the accident, the chances of the boy's life would have been greatly enhanced.

Meeting of October 22, 1885.

The President, Dr. B. F. WESTBROOK, in the Chair;

Dr. A. H. P. LEUF, Secretary.

Lymphadenosis.—Dr. H. A. BUNKER read notes of a case which, he remarked, was perhaps of special interest on account of the rapid course of the disease.

The patient, a maiden lady aged sixty, had been under his care for about three years, being the subject of chronic gastric catarrh, suffering during rather frequent exacerbations from severe attacks of palpitation of the heart, a sense of impending death, etc. She had had no trouble attributable to the menopause, which, she assured him, had occurred normally, and during his acquaintance with her she had never presented any symptoms pointing to uterine disturbance. She had recovered so far from her anæmic and debilitated condition, resulting from her gastric trouble, that for several months previous to her last illness he had not been called upon to prescribe for her. In June, 1885, she consulted him for œdema of the eyelids and slight swelling of the feet, complaining also of great weakness. Examination of the urine giving a negative result, a physical investigation showed an enlargement in each upper eyelid, hard and painless upon pressure, together with enlarged submaxillary, axillary, cervical, and inguinal glands. Later on an examination at her own home revealed what he, at that time, took to be a mass of enlarged mesenteric glands, but which the autopsy showed to be the specimen presented. He was unable to detect any change in the liver or the spleen, but perhaps this would have been difficult if they had been involved, on account of the enormous tympanitic distension of the abdomen. The heart and lungs presented no abnormality of action. The only subjective symptoms were loss of appetite and gradually increasing general weakness, besides the distress occasioned by the tympanites. On August 10th the patient had an attack of dyspnœa followed by great prostration. Subsequent attacks occurred in rapid succession until September 5th, when the patient died of asthenia and asphyxia.

From the appearance of the dyspnœa, due, as he believed then and as was shown at the autopsy, to the encroachments of the enlarging bronchial glands, the failure of the patient was rapid. The temperature, which had previously remained about stationary at 100° F., rose to 103° and 104°, and so continued to the end. The pulse, which had been from 80 to 84, now rarely fell below 100, and during the attacks of dyspnœa would rise to 120, 130, and 140 to the minute. During the early part of this distressing period Dr. W. H. Bennett was called in consultation and confirmed the diagnosis of lymphadenosis.

The autopsy was held eight hours after death, by Dr. W. C. Sneden, Dr. Bennett and the speaker being present. The body was much emaciated and showed well the enlarged superficial glands. Rigor mortis was very slight. Upon opening the thorax, the right pleural cavity was found to contain, as estimated, about a quart of serous effusion. This effusion he considered a passive one, although there were some very old and tough adhesions of the right pleura; it was certainly of recent origin. The bronchial glands showed considerable enlargement, forming quite a large mass. The lungs presented a peculiar appearance, due to the presence of great numbers of small nodular growths thickly scattered over their surface and having a grayish-white color. The heart, having presented no abnormal symptoms during life, was not examined. The entire alimentary canal was empty of solid or fluid matter, but was greatly distended with gas. The liver seemed normal as to size, weight, and consistence, and on section presented nothing unusual. The spleen was perhaps slightly enlarged and was somewhat friable. The mesenteric glands were not involved to any very great extent. The specimen presented rested upon the brim of the pelvis and appeared to be suspended from the umbilicus by a thick fibrous cord, which could be nothing but the urachus, as far as could be judged. Its main attachment was to the anterior aspect of the uterus by a thick, strong pedicle. The bladder was entirely free from either tumor or suspending cord, and presented no evidence of any inflammatory or other detachment of the urachus. From the appearance of the stump of this suspensory cord, it might seem probable that the growth originated within its structure, but the firm peduncular attachment of the tumor to the uterus, together with the presence of other subperitoneal and interstitial tumors, would show it to be of uterine origin.

Section of this tumor revealed a rather extensive calcareous deposit. A microscopical examination, made by Dr. Sneden, although not yet complete, owing to insufficient hardening, showed sufficient departure from what we might expect in simple uterine fibroid to warrant a suspicion that it might possibly have been the starting-point or exciting cause of the general glandular affection; or, following Trousseau and some others, the source of infection. In the sections made, although fibrous tissue predominated, there was an abundance of cellular and mixed cellular and fibrous tissue. The true fibrous tissue appeared to have been crowded aside by a cellular growth or deposit which answered very well to the descriptions given of lymphadenoma, or glandular hyperplasia.

This tumor, evidently, had an existence antedating by many years the appearance of general or local glandular enlargement. The rapid, almost malignant course of the disease in this case would seem to support the theory of infection. In view of the conditions named, both physical and pathological, might not the progressive glandular growth be considered somewhat closely analogous to the similar condition found in cancerous

infection? The speaker might be in error as to the microscopical appearances described and their significance, and the tumor might be a fibrous sarcoma as described by Rindfleisch, but it seemed to him that the question as to possible infection would still be a pertinent one.

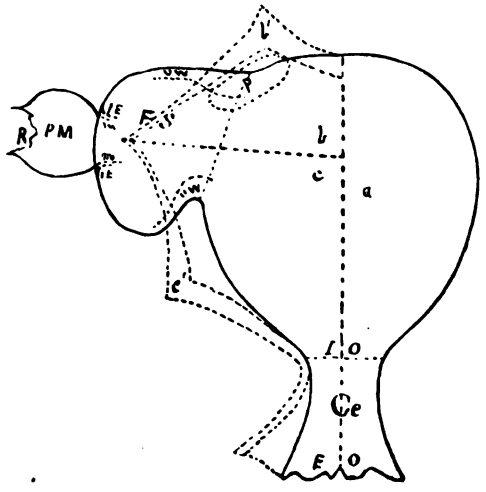
Tubo-uterine Gestation.—In behalf of Dr. JOHN F. VALENTINE, the secretary presented a specimen with the following history: A German woman, twenty-three years old, had been pregnant four times, the four pregnancies resulting in an abortion at six months and a half, one at seven months, premature labor at eight months, and the condition shown in the specimen. She had been a strong, healthy girl, there was no history of syphilis, and no reason had been ascertained for her abortions. Twenty-four hours before her death, when she had been but eight days in this country, she was taken with "strange feelings" in the lower part of the abdomen, accompanied by considerable pain and fainting spells. These symptoms increased, and two hours before her death she was seized with convulsions. She died in collapse. The physician in attendance refused to certify to the cause of death, and the case fell into the hands of the coroner, for whom the autopsy was made.

Post mortem, a large quantity of bloody fluid was found around the uterus and ovaries, while the more dependent parts of the pelvis and abdomen contained a single mass of clotted blood. In this was found the fœtus, estimated to be between two and three months old. The organs were normal, except for marked anæmia. It was desired to call attention to the exact site of this gestation-sac, being that portion of the tube which passed through the uterus. The muscular fibers of the uterus visibly surrounded the sac in part. The thickening of the mucous membrane of the uterus was also to be seen, and its extension through the tube into the sac. The right tube was the one affected.

Dr. CHARLES JEWETT said the case was interesting because of the rare position of the fœtus and the difficulty of diagnosis. Cases of the kind had been diagnosticated and treated by cervical dilatation and evacuation of the fœtal sac. The condition could also be treated with electricity. He thought the value of the case would be much increased if a careful anatomical description accompanied its publication, and suggested that this be done by the president or secretary.

By request of the president, the SECRETARY read the following description: "The form of the uterus is that depicted in the diagram, in which the proportions of the original have been maintained unchanged. The measurements of this organ are as follows: Length, 11·5 ctm.; width, 7 ctm.; thickness, 5 ctm.; thickness of fundus at center, less than 1 ctm. The cervix was 4·25 ctm. long. The external os was very irregular and filled with transparent tenacious mucus. The fœtal sac projected outward from the right side of the uterus about 4 ctm., with its upper surface a little below the fundus. Its lower end was dependent, hanging fully 1 ctm. below its inferior attachment. The vertical diameter was fully 5 ctm. The placenta was found attached high on the anterior uter-

ine wall adjoining the opening between the uterine cavity and the sac; it measured 3 ctm. in length, 1·7 ctm. in width, and about 0·6 ctm. in thickness. The membranes had separated from it during extrusion from the sac. The sac contained part of the membranes, some clotted blood, and a mass of chorionic villi. A circular opening, 2 ctm. in diameter, with its anterior, superior, and posterior edges inverted and partly adherent to the protruding membranes, was found at the postero-external aspect of the sac. The projecting membranes exhibited a rent 3 ctm. in length. This mass of dislocated membrane formed a cavity estimated at about 2·5 ctm. in diameter. The inner (uterine) third of the wall of the sac was formed by the muscular wall of the uterus, which gradually shaded off into hypertrophied mucous membrane internally, serous membrane externally, and an intermediate layer of a little muscular and considerable connective tissue. The mucous membrane of the cavity of the body of the uterus was thick, soft, and exfoliating. That of the cervix was congested, slightly thickened, but firmly adherent, and did not present



ANTERIOR VIEW.—*a*, left lateral half; *b*, right upper segment; *c*, right lower segment; *b'*, *c'*, the same reflected and marked in dotted outline; *P*, placental site on the right antero-fundal wall; *UW*, uterine wall in dotted outline, to show how it partly formed the wall of the sac; *FS*, fœtal sac; *PM*, protruding membranes at the extero-posterior aspect of the sac; *R*, rent in the same, through which fœtus, liquor amnii, and blood escaped; *IE*, inverted edges of the sac at the orifice of rupture, and between them the protruding fœtal membranes, *m*; *Ce*, cervix; *IO*, internal os; *EO*, external os.

the common *arbor vitæ* appearance. The ovaries were normal, and that on the right side contained a corpus luteum measuring 2 ctm. by 2·5 ctm. in diameter. Four points are worthy of note: the location of the placenta as compared with the situation of the fœtus; the co-existence of an abun-

dant mass of chorion with a well-formed placenta; the external extension of the sac; and the inversion of the sac wall and its adhesion at the place of rupture to the protruding membranes. In explanation of the first point, it may be held that, while the fœtus was arrested in its passage toward the cavity of the uterus in that portion of the Fallopian tube near the uterine infundibulum, and there developed, the placental formation began in the infundibulum, at the point of junction between the intruding chorionic villi and the uterine mucous membrane, and thence extended still farther inward toward the cavity, and not in any other direction. Its failure to grow toward the sac can be accounted for by too great pressure in this direction while there was none in the other. The existence of an abnormal amount of chorion may be explained by the fact that the wall of the fœtal sac had not the absorbing and other active physiological characteristics that are possessed by the uterine mucous membrane, and that on that account the atrophy of the chorionic villi was retarded, while the growth of the placenta met with no obstacle. The outward instead of inward extension of the ovum, though it had an interstitial site, may be accounted for by the relative thinness of the wall of the uterus at the apex of the infundibulum. Equilateral pressure at this point in all probability meets with more resistance, extending inward than outward, and, as most growing bodies (abscesses, tumors, etc.) tend in the direction of least resistance, so this obeyed the same general law and protruded in preference to intruding.

"The last point of interest is worthy of careful consideration and deserving of study. The question is, Did the adhesion take place before or after rupture? The sac may have become thinner and thinner during distension until forced to give way to over-distension, and been followed by the sudden extrusion and rupture of the membranes, and an inversion of the edges of the sac rent so as to bring the peritoneal surface of the sac in contact with the membranes, and thus cause an adhesive union between the two. On the other hand, the gradually increasing distension may have caused an atrophic thinning and ultimate absorption of a part of the sac, permitting the membranes to protrude and at the same time slowly become adherent to the opening, and then the membranes may subsequently have ruptured from over-distension. Whichever of these two views is correct can not very positively be settled, but the probabilities seem largely in favor of the former theory. Twenty-four hours elapsed from the onset of symptoms until death, and, from cases I have seen, such as of bullet wounds of the abdomen, when the length of time between cause and effect could be most positively established, quite firm adhesions have sprung up in less time than twenty-four hours."

The following paper was then read:

THE NERVOUS SYMPTOMS OF SO-CALLED LITHÆMIA.

By LANDON CARTER GRAY, M. D., Brooklyn.

Dr. Murchison, in his brilliant course of Croonian Lectures, delivered before the Royal College of Physicians in 1874,* described, under the heading of "Functional Diseases of the Liver," a group of symptoms for which he suggested the name of lithæmia. For the same condition Dr. Austin Flint had, some six years before, coined the name of uricæmia; but Dr. Murchison's designation has been the one that has come into vogue in the time which has since elapsed. Dr. Murchison's theory was based upon some undeniable clinical facts—as that in gouty persons uric acid was to be found in the blood, as Garrod had shown, and that uric acid and the urates, in seemingly large quantities, were also to be found in the urine of individuals of gouty heredity or gouty tendencies—and upon one assumption, which was that therefore these individuals were to be regarded as suffering in a lesser degree from the same underlying hæmic troubles as were the gouty. Thus supported, the theory was elaborated with a wealth of learning and a charm of style that made it alluring, the more especially as it was so very simple. "When oxidation," he says,† "is imperfectly performed in the liver, there is a production of insoluble lithic acid and lithates, instead of urea, which is the soluble product resulting from the last stage of oxidation of nitrogeneous matter. . . . When more food is taken into the blood than is necessary for the nutrition of the tissues, the excess is thrown off by the kidneys, lungs, and skin in the form of urea, carbonic acid, and water, or in the imperfectly oxidized forms of lithic acid and oxalic acid. Under these circumstances, an excess of work is thrown upon the liver and other glandular organs, and one result is that a quantity of albumin, instead of being converted into urea, is discharged by the kidneys in the less oxidized form of lithic acid or its salts. But what in most persons is an occasional result of an extraordinary cause is in some almost a daily occurrence, either from the food being always excessive in amount or unduly stimulating, or from some innate defect of power, often hereditary, in the liver, in virtue of which its healthy functions are liable to be deranged by the most ordinary articles of diet. Most persons appear to have

* "Clinical Lectures on Diseases of the Liver," New York, 1877.

† *Loc. cit.*, p. 565.

more liver, just as they have more lung, than is absolutely necessary for the due performance of its functions. But in others, not infrequently the offspring of gouty parents, the organ in its natural condition seems only just capable of performing its healthy functions under the most favorable circumstances, and functional derangement is at once induced by articles of diet which most persons digest with facility. This functional derangement may manifest itself by various symptoms of indigestion, by disturbances of circulation, and of other physiological symptoms, but especially by deposits of lithic acid, lithates, and pigments in the urine." The name was new, the theory was old; but under the new name the old theory has attained to wide-spread popularity and wide-spread therapeutic application. Dr. Murchison, while dwelling at length upon the digestive, circulatory, cutaneous, and pulmonic symptoms of this condition, also described its peculiar nervous phenomena; but this latter aspect of the subject does not seem to have attracted relatively much attention until the paper of Dr. Da Costa,* in 1881, awakened a certain amount of professional interest in it. Since then there have been numerous contributions to the literature of the subject, notably by McBride,† Lyman,‡ Hudson, and Potter.#

The nervous symptoms are manifold, consisting of—

1. Vertigo.
2. Cephalalgia.
3. Insomnia.
4. Nervousness.
5. Susceptibility to odors.
6. Tinnitus aurium.
7. Neuralgia and pseudo-neuralgia.
8. Paræsthesiæ.
9. Occasionally slight anæsthesia.
10. Muscular cramp and twitchings.
11. Vaso-motor disturbances.
12. Fever.

In addition, we may even have the type of such diseases as—

13. A delusional mental condition.
14. Myelitis of the anterior cornua.
15. Hysteria.

* "Am. Jour. of the Med. Sci.," October, 1881.

† "Amer. Jour. of Neurology and Psychiatry," February, 1883.

‡ "Boston Med. and Surg. Jour.," December 13, 1883.

\# "N. Y. Med. Jour.," May 23, 1885, p. 591.

16. Neurasthenia.
17. Epilepsy.
18. Disseminated sclerosis.

The mere catalogue of these symptoms indicates the importance of the subject. I have been astonished at the frequency of the condition; but I have been still more astonished at the frequency with which the disease has been mistaken for grave organic affection of the nervous centers. Many a man have I seen go forlornly from climate to climate in search of relief, weighed down by the gloom of a supposed incurable malady, which a dose of calomel or blue pill would have done more to ameliorate than the soft airs of the Hesperides or the mountain grandeurs of Switzerland. I have known prosperous and ambitious careers to be thus absolutely checked for the time being; indeed, I know at this present time of a gentleman who has entirely abandoned an excellent business and hopelessly buried himself on a small farm, and yet I believe his to be an entirely curable case. When we come to examine the symptoms in detail we can better comprehend why a mistake should have been so often made, especially when the comparative novelty of the subject is remembered.

1. *Vertigo.*—This is probably the most frequent of all the symptoms, as it is certainly the most distressing. Dr. Da Costa states that the giddiness is "objective, not subjective; objects seem to whirl around the sufferer, not he himself to move." This limitation has not been warranted in my experience. I have found it both objective and subjective. When it is the latter, the patient feels as if suddenly pushed, as in Case I; or he has a sensation as if he were swaying or undulating; or he may feel as if he were himself staggering. The sensation of the sudden push or shove has been so pronounced in certain individuals as to simulate the vertigo of Ménière's disease. There is no accompanying loss of consciousness, but there is often a sudden, sharp, and marked impairment of it. The vertigo is of short duration. It comes suddenly. It may come without the slightest apparent reason, or it may have many exciting causes. A curious characteristic is that it may often be severe when the other symptoms of the lithæmic condition are much improved or have almost disappeared. Fatigue, mental or physical, may excite it; so may special articles of food. Dr. Da Costa speaks of patients with whom a few glasses of hock, or a single glass of burgundy or champagne, may cause it, and I can confirm his assertion. Tobacco, especially cigarettes, may produce it. Slight strain to the ocular

mechanism of accommodation may provoke it. It was pointed out some years ago, as you doubtless know, by Dr. S. Weir Mitchell, that unremedied defects of accommodation would of themselves cause vertigo; but this lithæmic vertigo may be provoked in those whose refractive errors have been remedied by such slight strain as wearing different pairs of glasses, even though these glasses be precisely similar in construction, or by changing from a glass for far vision to one for near vision, or by using the microscope. Purgatives and salines, which may relieve the other lithæmic phenomena, may increase the vertigo, although this increase is usually temporary unless the purgation is extreme, or the laxative is continued so long as to depress the general nervous tone. It may continue for months. Its severity and obstinacy are at times remarkable, and such as to try the nerve of the most resolute. One patient of mine, a well-known public man of great strength of will, came near pitching down the Capitol steps at Albany in a sudden vertigo of this kind, and took the next train home in great alarm. A physician of this city became so afflicted with it that he was afraid to trust himself on the street for fear of falling, and, lest his patients should take his uncertain gait to be of alcoholic origin, went to the country and remained there four months, during all of which time he did not dare to trust himself to walk alone a quarter of a mile. I was called in to see a very calm, sensible lady who had been afraid to leave her bed for weeks because of this alarming dizziness. I have known more than one physician to make his will because of it; and I have now under my care a patient of hereditary tendency to periodic inebriety in whom the fear of this vertigo is a much more effective restraint than the combined influence of a total-abstinence pledge, a Sunday-school, grieved and sorrowing parents, and a business failure.

According to Dr. Da Costa and Dr. Murchison, when the vertigo is often repeated it may lead to limitation of the visual field, amblyopia, and double vision. This I have seen. But I have never observed temporary blindness of one eye, or part of one eye, or retinal congestion, such as Dr. Da Costa mentions. I have several times seen a venous fullness, to which he alludes. Retinal congestion is, as is well known to ophthalmologists, often difficult to determine, and it may well be that what one observer will regard as hyperæmia may seem dubious to another. I am, however, decidedly in accord with Dr. Da Costa upon the important fact that choked disc never occurs.

2. *Cephalalgia.*—Occasionally there is a dull ache over the brow,

less often in the occiput, in the morning or after eating. Usually, however, there is not a true headache; simply a sense of distension and fullness about the head. Dr. McBride states that there is no surface tenderness.

3. *Insomnia.*—This may be exceedingly persistent, resisting hypnotics of every kind, yet yielding promptly to proper treatment.

4. *Nervousness.*—Next to the vertigo, this is probably the most frequent of the symptoms. It may be accompanied by irritability of temper. This nervousness and irritability of temper will often be beyond the control of those who have usually a strong will; much more is this the case, then, in those whose volitional power is normally feeble, so that in these latter the effect is too often taken for the cause, and hysteria is diagnosticated, the underlying condition overlooked, the patient contemned, and sent away to suffer in tacit disgrace.

5. *Susceptibility to Odors.*—I have known patients to grow pale and nauseated at odors that would ordinarily be unnoticed by them. So that one could conceive that an aggravation of their trouble might almost render it possible for them to

"Die of a rose in aromatic pain."

6. *Tinnitus Aurium.*—This may be due to the underlying condition, or it may be caused by a pharyngitis obstructing the orifice of the Eustachian tubes. It is curious that none of the writers on this subject have mentioned this last ætiological factor, which I have found to be very frequent, although Sir James Paget has described in the gouty a peculiar reddish and glazed appearance of the fauces, as if smeared over with glycerin.

7. *Neuralgia and Pseudo-Neuralgia.*—The most usual forms of neuralgia are sciatica, brachial neuralgia down the arm to the fingertips, neuralgia of the tongue, of the breast, intercostal neuralgia, gastralgia, and enteralgia. Dr. Da Costa states that it merely affects the fifth pair, and I think he is right. He also expresses the belief that the irritation of the uric acid may lead to a neuritis. I doubt this. Indeed, I believe, judging from a considerable clinical observation of this point, that the very great infrequency or absence of neuritis is a diagnostic sign of value in differentiating lithæmic pains. The pseudo-neuralgias are vague aching pains, like the so-called "rheumatic" ones, a sharp pain in the eyeballs, dull pain in the ensiform cartilage, a dragging sensation along the course of the ureters, wandering pains (which, as Dr. McBride says, may be mis-

taken for those of locomotor ataxia), ill-defined pain over the region of the liver, etc.

8. *Paræsthesiæ*, such as numbness, tingling, fuzziness, or whirring sensation at the crown of the head.

9. *Anæsthesia.*—This may occasionally occur, and, according to Dr. Da Costa, may be "localized to an arm, or leg, or part of the thigh, or, what is not unusual, on corresponding parts of the arms and legs." This may be very misleading, especially when conjoined with the paræsthesia. I have on two occasions had patients under my care who presented these paræsthesiæ and some slight impairment of the tactile sense, and who so far infected me with their own alarm and dread that I was for some days in doubt as to whether they were not on the verge of a myelitis.

10. *Muscular Cramps and Twitchings.*—The cramps principally affect the gastrocnemii, and come most often at night and in cold and damp weather. Twitchings of the face and the eyelids are also seen at times. Dr. Da Costa has observed irregular choreic movements in children. Dyce Duckworth and others have seen fibrillary contractions of muscles.

11. *Vaso-motor Disturbances.*—Flushings and pallor of the face, sensations of heat and cold, are very common. Aside from these, however, Dr. McBride states that he has seen a case of that rare form of vaso-motor spasm of the upper extremities known as "digiti mortui" in a lithæmic.

12. *Fever.*—That febrile movement may occur is evident from the following history, which also illustrates many other interesting points to which I shall have occasion to call attention:

Case I.—Professional gentleman, about thirty-eight, stout, strong build; ordinarily perfectly healthy. Has for eight years past been troubled with the same symptoms every spring and early summer. They begin with the first gradual increase of temperature in the spring, and culminate upon the approach of the first decidedly hot weather, when the thermometer rises to 80° or 90° F. At first these symptoms consist merely of the usual lassitude of spring. Then there ensues a sudden dizziness, often disappearing as suddenly as it came, recurring, perhaps, several times in the same day, or, on the other hand, not for several days. This dizziness may appear when the patient is at rest or when he is in motion. It usually consists of a sensation of sudden pitching to one side. Upon one occasion the patient, who was walking along the street, was obliged to catch hold of a railing to prevent himself, as he thought, from falling. Upon another occasion, while seated in a chair, engaged in conversation, he felt as if he had been suddenly pitched to

one side with, as he expressed it, great rapidity, smoothness, and precision, although in reality he only swayed slightly. As the weather becomes warmer, these symptoms increase in severity, the dizziness becomes more frequent, may even become almost constant, and to it is added a slight headache that manifests itself occasionally, being more a sense of distension and fullness of the head than any actual pain. During all this time the appetite remains either not at all affected or but slightly so; nay, it may even happen that it is increased. The color is not changed, except as it suffers from the slight vaso-motor changes that are usual to such anxiety and misery as the patient very naturally feels about his condition and as imprints itself upon his features. Twenty-four or thirty-six hours before the approach of the first hot spell the patient is apt to experience a sense of utter exhaustion and depression, so that he seeks to lie down and avoids the least exertion. To this sense of exhaustion, if not properly treated, may succeed a chill, and a fever that assumes a remittent type and may run up to 102° and 103° F., or even to 104°. This fever, preceded by the symptoms as described above, came regularly for four years. Then, in the fifth year, a new method of treatment was adopted in the place of that which we will describe further on. As it had been observed that the fever always appeared just before the hot spell, the patient left town in a few hours after experiencing the first symptoms of the prodromic exhaustion and went to the sea-shore. The relief was immediate. In town, in the morning, he felt, as he poetically described it, like one in Dante's "Inferno" who had passed beneath the portal bearing the inscription: "All ye who enter here, leave all hope behind." In the evening, by the sea-shore, he felt vigorous and blithe. Singular to say, however, when undressing for bed, the room feeling cool to him but not chilly, he had what he termed a severe "nervous chill," by which he meant one without fever, although his teeth chattered—a notable demonstration of the instability of his nervous system at this particular time. The rise of temperature, which his sensations had so accurately presaged, having been followed in twenty-four hours by cool weather, the patient returned to town, and felt unusually well until the next hot spell, when, instead of great exhaustion and fever, he experienced persistent and severe dizziness. He again went to the sea-shore for relief, and obtained it, although not so completely as at first; but upon the first return to town the old symptoms returned. Free purgation and the administration of a mineral acid were tried, ameliorating the conditions temporarily. Finally, however, as the patient's lassitude and weariness became so marked that I grew to be seriously apprehensive of his passing into some low febrile type, I sent him out of town for the summer, first to the sea-shore, then to the mountains. He passed a comparatively comfortable summer, although he was weak and miserable as compared with his former robust self. Returning to town in the early autumn, for the first few weeks he was easily fatigued and occasionally had vertigo, and then regained his usual excellent health. It is noteworthy

that this autumn (that of 1884) had a week of intensely hot weather, the thermometer rising day after day to 95° and 100° F., and yet he did not experience so much inconvenience as most of his friends. During the following winter this patient was very careful about not fatiguing himself, about regulating his bowels, and, although no special attention was paid to diet, his health was excellent. The following spring he was more than usually cautious about his excreta and diet, but he did not escape trouble, although his symptoms were modified. In a drive of several hours upon a warm day his feet became slightly chilled, probably because he had removed the flannel drawers which he had been wearing through the winter. That night he was out till near midnight, and became very chilly during a short walk homeward. He at once went to bed, but was awakened two hours afterward with a violent gastralgia and enteralgia, which lasted some twelve hours, and was only relieved by free purgation and opiates, leaving him, however, sore abdominally for a week after. Some three weeks afterward he had a precisely similar attack, which culminated in a febrile rise to 104°, but was checked by purgation and opiates, without quinine. This latter attack had no recognizable cause, either as to temperature or food. The following summer (that of 1885) this gentleman has been unusually well, and has had no trouble in the autumn.

13. *Delusional Mental Condition.*—Case II.—Woman of medium build, aged forty-eight, fairly well nourished. Lost a favorite son a few months ago. Was greatly wearied in incessantly nursing him during a protracted illness, and grieved quietly but intensely at his death. Has since been much depressed, apathetic, listless. Has lately been unable to sleep. Has imagined that people have designs upon her, although she can not state what they are. Imagines that strangers, whom she sees on the streets or in public places, are talking about her; thus, while on the way to my office, insisted on getting out of the car because she believed that some people in the car were talking about her. Upon my interrogating her patiently, she would acknowledge that this was a delusion; then, in a moment, would maintain that it was not a delusion; and again, in another moment, would seem to be in doubt as to whether it was or was not. It was a beautiful demonstration of molecular action in cortical cells that were oscillating upon the verge of downright disease. Her cerebral reflexes seemed to be rather sluggish—*i. e.*, she would evidently make an effort to follow my meaning as I questioned and argued with her. This was the more manifest as she looked like an unusually intelligent woman, as her relatives stated that she was and as I afterward found her to be. With these exceptions she was intelligent enough. At home she would talk to herself at times, and do little things that indicated slight mental confusion. The tongue was heavily coated. The bowels were constipated. Urine deposited "brickdust" sediment, and contained abundant uric-acid crystals and a few of oxalate of lime. Her appetite was poor. Skin was muddy and pale. She bore a weary, anxious look; pupils were

dilated; pulse was feeble and slow. Up to the time of her son's illness she had been, I was told, a healthy woman. I could obtain no history of any previous disease. This patient was purged freely, then put upon dilute nitro-muriatic acid and a bitter tonic; the bowels were regulated by an aloetic, the diet was carefully attended to, and she made a speedy recovery in a few weeks. Six months afterward I was informed that she had remained perfectly well.

I have seen several cases that were more or less similar.

14. *Myelitis of the Anterior Cornua.*—Buzzard speaks of a case of paralysis of one leg in a child, whose urine was overloaded with uric acid, and who was completely cured by a few doses of citrate of potassium. The following case is more marked:

J. L., aged thirty-eight, a comparatively young man, of excellent health, excellent habits, except that he smoked to excess, who was retiring from business with a competence after twenty years of hard work; he had not, however, felt himself overworked. The onset of the symptoms extended over some six days, at the end of which time he walked with effort, and complained of slight subjective paræsthesiæ in upper and lower extremities. Slight diminution in response of nerves to faradism and galvanism. No polar changes. Sensations of touch and pain very slightly impaired, distinct motor weakness of lower extremities, no electrical alterations. Bladder and rectum unaffected. No tendon reflex. Diagnosis of polio-myelitis anterior. Patient made a good recovery in the course of a month, but has, from time to time since, had slight returns of the symptoms, which were always promptly relieved by treatment.

15. *Hysteria.*—That lithæmia may induce hysteria in a certain class of individuals who are predisposed to this nervous affection hardly needs to be repeated, but the fact is apt to be overlooked that it may induce hysteriform symptoms in those who are usually self-controlled and well-poised.

16. *Neurasthenia.*—Dr. McBride states that all the cases of neurasthenia which he has seen have been due to suboxidation, lithæmia, oxaluria, or a condition brought about by eye-strain. My experience has been different. Indeed, as I shall point out when I speak of the treatment, I deem it very important to make a sharp clinical distinction between neurasthenia caused by these various conditions and neurasthenia which is, so to speak, idiopathic.

17. *Epilepsy.*—It has been alleged that epilepsy was occasionally of lithæmic origin, but the only proof that has been advanced of this assertion is that epilepsy has improved under anti-lithæmic treatment. In my article on epilepsy * I have called attention to the

* "New York Medical Journal," June 28, July 5, 1884.

mobility of the epileptic nervous system, to its impressibility by a hundred forms of treatment—different drugs, circumcision, ovariotomy, excision of cicatrices, blows, falling into hot water or the open grate, etc. And I have also called attention to the fact that epileptics have spontaneous remissions of convulsions, which may vary in time from a few months to even ten or twenty years. I should therefore hesitate to draw any conclusions from any temporary improvement. But I have seen marked improvement effected temporarily in many cases by anti-lithæmic treatment.

18. *Disseminated Sclerosis.*—Dr. McBride says: "In three cases of disseminated sclerosis in which the patients suffered much from lithæmia, the symptoms of the sclerosis entirely disappeared in two, and were much alleviated in one, by the treatment of the lithæmic condition. In the first two, as long as they live in the open air, are careful in diet, and make use of an occasional cholagogue, they remain free from symptoms; return to town, however, and a renewal of city life, bring back tremor, restlessness, and difficult articulation." I have never seen lithæmic sclerosis of this type.

The typical urine of lithæmics has the following characteristics: It is acid, highly colored. It possesses a high specific gravity, which, as Dr. McBride says, is usually 1·028 to 1·034 in a morning specimen, and may be 1·030 in the whole amount passed in the twenty-four hours. As to the quantity, Dr. McBride and Dr. Da Costa differ. The former says that it may be normal, increased or diminished, while the latter affirms that it is very generally scanty. My experience coincides with Dr. McBride's. Uric-acid crystals are often visible to the naked eye, in the well-known "cayenne-pepper" forms. The pigment is increased. Microscopically, uric-acid crystals are seen, occasionally octahedral crystals of oxalate of lime, commonly the amorphous urates, globular crystals of urate of sodium with spicules. The urea is not generally increased when flesh is being lost (Da Costa). Albumin and sugar are sometimes temporarily found.

The question as to the pathological nature of this disease is not only an interesting one from a scientific point of view, but is also of great practical importance in its bearings upon a rational system of therapeutics. At the outset, however, it should be understood that the name *lithæmia* (λίθος, a stone, and αἷμα, the blood) is a misnomer, because it is a pure assumption to say that uric acid is to be found in the blood in this condition. Garrod, as is well known, discovered uric acid in the blood of gouty people; there is undoubtedly a certain clinical relationship between the gouty and the so-

called lithæmic, but no one has demonstrated the presence of uric acid in the blood of the latter. The older name of *lithuria* was a better one, for it designated a condition which could be spoken of in more positive terms. This term, in its turn, gives undue prominence to one clinical feature, which, instead of being the cause of the disease, may, for aught we know to the contrary in the present state of our knowledge, be but a symptom. I would therefore suggest the name of *lithoidosis*, meaning *a lithic-acid-like diathesis*, as more comprehensive and less dogmatic, and more permissive of future developments. For, when we come to look at the subject in more detail, it is apparent that there is great need of much further observation and investigation. The theory that uric acid is a product of suboxidation relatively to urea has been met by the fact that in birds and certain reptiles,* representing the maximum and the minimum of the oxidative processes in the living series, uric acid is to be constantly found in the urine, taking the place of urea. As a remarkable demonstration that oxidation can be no great factor in the production of the phenomena with which uric acid is associated, is the further fact that gout has been found in these two oxidative extremes—birds and reptiles.† Mégnin and Bertin found numerous urate crystals in the joints of parrots. Aldrovandi saw chalky deposits in the claws of hawks. Pagenstecher, examining an *Alligator sclerops* five days after death, found deposits of urate of soda in all the muscles, also free uric acid in the hip joint, the chemical analysis being made by Professor Carius. Liebig saw uric-acid crystals in great number in the muscles of another alligator. Foster's conservative dictum upon this subject would seem to be the only one that is warrantable: "All the facts known go to show that the appearance of uric acid is the result of a metabolism slightly diverging from that leading to urea."‡ Nor does the assertion that the excessive formation of uric acid is due to functional disease of the liver rise above the dignity of a pure assumption. The source of uric acid is not known. Von Schroeder extirpated the kidneys in fowls and reptiles, and ligatured the aorta and vena cava in fowls, and still uric acid was formed in considerable quantity, thus demonstrating that it was not produced in the kidneys. Meissner regarded the liver as the main formative organ, although he admits that the spleen and the nerve-centers take part in the manufacture; but Meissner's experiments are lacking in the

* Foster, "Text-book of Physiology," 1880, p. 452.

† Ebstein, "Die Natur und Behandlung der Gicht," Wiesbaden, 1882, S. 51.

‡ Foster, *loc. cit.*, p. 452.

crucial test of the elimination of the liver, and simply demonstrate the presence of large and constant quantities of uric acid in the liver of birds. Ranke maintains that the spleen is the chief producing organ. Robin, Chrzonscewsky, and Colasanti believe that uric acid originates in the connective tissue.* If any conclusion can be drawn from these differing experiments, it is that the production of uric acid is not monopolized by any one tissue, but that the spleen, the nervous system, the liver, the connective tissues, all have their share in the formation of it. Let this aspect of the matter, however, be decided as it may—let uric acid be formed in one organ or all the organs—the question still confronts us, Is it a cause or an effect? It is a familiar fact that Claude Bernard produced diabetes by irritating a certain well-defined area in the floor of the fourth ventricle. Hence the possibility of diabetes being of nervous origin is demonstrated, and the clinical features of many cases of diabetes are such as to render it extremely probable that they are due to affection of the nerve-centers. Certain it is that in the whole vast range of medicine there is nothing that has been more conclusively demonstrated, clinically and post mortem, than that the nervous system has a most powerful control of cellular action. Atrophy of muscle, conversion of muscular tissue into fat, cutaneous eruptions, sloughs, ulcers, tumefaction of joints and serous effusions into and around them, trophic changes in bones leading to atrophy and fractures—all these are phenomena that are now known beyond question to arise from diseases of the nervous system. It seems absurd to question that the agency which is capable of so radically perverting cellular action is not also capable of affecting so relatively slight a cellular change in some tissue or tissues as to lead to the production of uric acid. *A priori*, then, uric acid in so-called lithæmia may be a product as well as it can be a cause. I am convinced that this possibility should never be lost sight of in the therapeutics of this affection. I have over and over again been struck by the disproportion of the nervous symptoms to the quantity of uric acid discoverable in the urine, as well as by the obstinate persistence of grave nervous symptoms after every effort had been made to keep the excretory organs acting freely. On the other hand, there are many cases in which a purge, laxatives, diuretics, and alkalies will promptly give relief. And in all cases a certain amount of attention must be bestowed upon excretion through the bowels or skin. But these cases are those with relatively slight nervous symptoms, so far as

* Ebstein, *loc. cit.*, S. 54 *et seq.*

my experience goes; and, even if they were not, a purge, laxative, diuretic, or diaphoretic very often ameliorates the symptoms in nervous or other organic disease in which defective excretion is admittedly but an effect.

Whatever be the real pathological nature of this affection, there is no doubt but that its nervous manifestations are often provoked by extrinsic causes. These are:

Changes of the weather.
Fatigue, mental or physical.
Special articles of diet.
Certain wines.
Improper clothing.
Malaria.

In my experience, most of the relatively acute outbreaks are apt to occur in the spring or early summer—much more frequently, singular to say, than in the autumn. In some, as in Case I, there is especially apt to be trouble at the first onset of very hot weather. All those who have lived in and around New York know that our spring is a very uncertain season, the gradual rising of the thermometer being frequently interrupted by quick and violent changes back to a wintry temperature, until the latter part of May or early part of June, when the heat may suddenly reach 85° to 90° or more, and then merges into moderate summer. The changes are not apt to be so violent in the autumn, although the heat may be as great.

Fatigue, mental or physical, is a very frequent cause, and will often bring back the nervous symptoms after uric acid has ceased to be excessive in the urine.

Many patients of this class have an idiosyncrasy about special articles of diet or certain wines—far less, in my experience, about the former than about the latter. Thus the fact, to which Dr. William H. Draper * has called attention, that the gouty can not digest starchy and saccharine matters is often true to a certain extent of these individuals. Some can not digest sugar, some can not digest starch, but the most fail to digest more than a moderate quantity of one or the other, although I have never met with any whose digestion was absent simultaneously for both starch and sugar. Others, again, can not digest meat during hot weather, while they experience no difficulty from it during other portions of the year. Still others, again,

* In Pepper's "System of Medicine by American Authors," vol. ii, article "Gout."

can not digest eggs. The sweet wines and the malt liquors are very generally borne badly.

Improper clothing will, in some nervous systems that have become susceptible, often bring about a return of the nervous symptoms in an incredibly prompt manner. This applies not only to too much clothing in warm weather and too little in cold weather, but to clothing that is not made to follow the sudden changes that may occur from day to day in our variable climate. I have known an alarming dizziness or a neuralgia to disappear in a few minutes by the substitution of a thin for a thick coat on a hot day, or the reverse on a cold day. A curious thing is that this need for a change of clothing is often not betokened by any subjective sense of heat or cold, or any alteration in the bodily temperature. In some cases patients come to know by experience that the weather is becoming warmer by a feeling of nervousness and chilliness.

Malaria is often ascertained to have preceded this affection, and the inefficacy of anti-periodics in so many cases of so-called latent malaria is often due to the non-recognition of the fact.

The diagnosis should be easily made, one would think, yet the constant doubt of accomplished practitioners has taught me that it is not so in fact. The characteristic urine is, of course, of great aid. There is no doubt, however, if I may judge from my experience, that the nervous symptoms may appear without the peculiar appearance of the urine. Then, too, there is no convenient method of estimating the amount of uric acid that may be contained in a given specimen. Pavy's test,* to which Dr. Da Costa alludes, takes some half-hour of time; so that, unless the urinary peculiarities are visible to the naked eye or the microscope, few men have the time to make the necessary examination. Even if a handy method of quantitative analysis were known, no one has pointed out what amount is necessary to constitute the morbid condition of so-called lithæmia—a very fatal omission when it is remembered that the uric acid secreted daily by healthy individuals varies very greatly in amount. Dr. Roberts† observed a difference of nearly one half on two successive days, on the first day 5·45 grains being separated, on the second 11·7 grains! In three healthy students, living on a similar diet and under similar circumstances, he obtained these figures:

No. 1 (mean of 47 days).....	8,051	grains.
No. 2 (mean of 5 days).....	3,462	"
No. 3 (mean of 3 days).....	6,071	"

* "Lancet," 1875. † "Urinary and Renal Diseases," Philadelphia, 1872, p. 77.

The diagnosis must therefore, I think, often be made independently of the urinary condition. A coated tongue, constipation, and stomachic discomfort may all accompany the characteristic urine, or be alone present; but they are often absent—indeed, in some of the worst cases—and they certainly bear no ratio to the nervous symptoms. The nervous symptoms themselves are, I think, the ones upon which the diagnosis must be based in the largest number of cases. The vertigo, the sense of distension of the head, the tinnitus aurium, the undue susceptibility to odors, the nervousness, the insomnia, the peculiar neuralgia or perverted sensations, the vaso-motor disturbances—these symptoms, in varying combinations, the vertigo and fullness of the head being almost always present, constitute a characteristic group of symptoms, which become still more characteristic when other diseases capable of simulating them are excluded. The most brutal of all mistakes is the confounding of the disease with *hysteria.* Hysteria is too often thought to be what any other disease is not—is too often the refuge of a moral cowardice that can not look a scientific doubt squarely in the face—and particularly is this so in lithæmia. It provokes a smile, too, to see how often the sufferers themselves are deceived, even when they are medical men. A half-apologetic air, a deprecating remark, is the common prelude to the history of the symptoms. Hysteria may, of course, be induced by this as by many other diseases, the more readily, the more predisposed the patient has been to it; but there is no excuse for confounding it with the idiopathic form. In brain tumor the headache is violent and persistent, and not a mere sense of fullness; neuroretinitis is generally present, while it has never been observed in lithæmia; vertigo is seldom so marked, seldom occurs in such sudden paroxysms; vomiting is frequent, often of the sudden, explosive, seemingly causeless cerebral type; and, furthermore, in most cases, some evidence of structural impairment of the encephalon will appear, such as paralysis of motion or sensation, aphasia, hemianopsia, mental alteration. The vertigo of *Ménière's disease* is accompanied by signs of disease of the internal ear, such as deafness, loud noises, etc. *Malaria*, as I have said, often precedes lithæmia, and apparently causes or excites it; but the distinction should be sharply made between the two, because the quinine that may alone cure the former generally aggravates the latter. It is not of so much practical importance to make a sharp distinction from pure neurasthenia, because the latter disorder and severe nervous disturbance in lithæmia must, in my judgment, be treated in the same manner.

The *prognosis* is usually good. But I have found that severe nervous disturbance beginning in the late spring or early summer is often impossible to thoroughly master before the autumn comes. Regardless of season, too, it is by no means infrequently the case that the nervous disturbance, especially if it be severe, may continue for several months. When the tendency to this nervous disturbance is once set up it has a strong disposition to recur, most especially in the spring.

For purposes of treatment patients should, I am convinced, be divided into two classes:

1. Those in whom the nervous disturbance is slight.
2. Those in whom the nervous disturbance is severe.

The first-mentioned individuals are easily treated. If they be strong, robust individuals, the treatment may often be advantageously inaugurated by a brisk cathartic, such as the compound cathartic pill of the United States Pharmacopœia, which may be followed by a mineral acid, preferably the dilute nitro-hydrochloric acid. This brisk catharsis is much more apt to succeed in warm than in cold weather—why, I confess that I do not know. There are some seemingly robust individuals, however, who bear active catharsis badly, who are apt to have a marked depression of nervous tone follow; in these such purgation should always be avoided. If for these reasons, or because the individual is of the asthenic type, laxatives must be preferred, the Friedrichshall water is decidedly the best, then the Saratoga Congress water, the Hunyadi János, and the Saratoga Geyser. When the Saratoga waters are used, they had best be drank, when possible, from the mineral-water fountains in the apothecaries' or other places, as they are well charged with carbonic acid when put up in large quantities for such uses, while the bottles for individual use lose their sparkle after the first glass. They have not yet succeeded in using these American waters in siphons, because of the deposit of the salts contained in them. The carbonic acid enables the stomach to bear them better. The mineral waters should be used only for a moderate length of time. If they do not succeed in keeping the bowels easy and somewhat fluid, an aloetic must be used, or podophyllin, occasionally using the mineral-laxative waters. The mineral laxatives should be followed by some alkaline mineral water, such as the Saratoga or European Vichy, preferably the former on draught at the apothecaries', for the reasons that have just been mentioned, the Carlsbad, the Contrexéville, the American Capon Spring and Poland waters, and the Apollinaris. None of these min-

eral waters, however, should be pushed too far, or there may result a "mineral-water cachexia" such as Trousseau described. It is seldom necessary to use the mercurials, for they are very apt to depress the nervous tone. Occasionally a diuretic will be of material service. I have not found them reliable, however.

The patients of the second class, with severe nervous disturbance, should never be purged actively. On the contrary, great care should be taken that the laxatives be mild and gentle. Any depression of the nervous tone whatever must be sedulously avoided. I have over and over again seen great aggravation of the nervous symptoms produced by neglect of this rule. With patients of this class, too, the alkalies must not be used even so long as with the others, or else they will greatly derange the stomach; this will vary, however, with different individuals.

I am very decidedly of the opinion, contrary to what has been taught, that patients of the second class, and many of the first class, are made worse by exercise. They need rest. It seems to me that the fact has not been recognized that the so-called lithæmics are very generally suffering from such depression of nervous tone as to constitute genuine neurasthenia. Their symptoms are made worse by exertion. I have endeavored to show how uncertain our knowledge is as to whether the uric acid is cause or effect; moreover, even admitting, for the sake of argument, that the uric-acid excess sets up the nervous symptoms, it is conceivable that the nervous symptoms, once set up, may need special treatment; and yet exercise has always been strenuously advocated, as if we had an Old and New Testament in the way of pathological Revelation, and knew positively that the uric-acid excretion must be increased at any cost. To be sure, writers have cautioned patients not to take exercise to the point of fatigue; but the trouble is that most subjects of severe nervous lithæmia are always fatigued, that in others the fatigue may not be felt till after the temporary exhilaration of exercise has passed away, and that in others, again, even exercise without fatigue aggravates the symptoms. I therefore always prescribe rest for these patients, proportioning the rest to the needs of the case. In very severe nervous disturbance I put the patient to bed for a period of time running from a few days to one or two weeks. If they feel this confinement much, I have some gentle massage given every day or two; but even the moderate muscular movement of such massage may act unfavorably. When the nervous symptoms are not marked enough to require rest in bed, I restrict every possible expenditure of energy

until decided improvement is manifest. To what extent this shall be done must necessarily depend upon the judgment as to the needs of the particular case, always taking care, when in doubt as to the amount of rest, that the leaning shall be toward it. I keep a patient at home for a few days, perhaps in bed, perhaps merely on a sofa. If he be a business man, I have him ride to and from his place of business, preferably in a carriage, if his means will allow of it. I may order him to have his breakfast in bed, and not to rise till he is obliged to go to business. I may order him to go to bed or lie down on a sofa as soon as he returns from business, remaining quiet till the next morning. As I deem the patient fit to do more than this, I order him to ride out in a carriage, not on horseback, or, if it be summer, in the horse-cars, which are either the "open" ones or have the windows down. When health and strength are regained, I order short walks, which may be made longer in proper time. I am very cautious, however, about this, preferring that excretion shall be by the bowels rather than by the legs. Even when the patient has seemingly recovered, I always advise all possible avoidance of mental and physical fatigue. I endeavor to have every patient carefully and intelligently ascertain his or her limit of physical or mental endurance, not as they think it ought to be in health, but as it actually is in their present condition, and then keep well within that limit.

Since I have been on the alert as to the importance of this measure, I have had the most positive results in treatment, even in cases where foreign travel, and sojourn away from the city, at sanitaria, and at watering-places, have failed to bring relief; and these results have been direct and sequential enough to warrant me in speaking so dogmatically as I am aware I am now doing.

The relation of dietetics to this disease has been to me the source of great perplexity of opinion, as it has been to others. But, after considerable experience and clinical experimentation, I have come to the conclusion that there is no special diet for lithæmics, as a rule, except for short periods of time. Immediately after a nervous outbreak it is usually well to limit the patient's food to the relatively digestible articles, just as one would do in an acute disturbance of any kind. In very hot weather, too, it may be well to cut off meat for a few days. With these exceptions, however, I believe that these patients are like the most of the human race, in that they do better the more varied their diet is and the more irreproachable in quality. The cooking is of far more importance, I think, than the chemical nature. There are here and there individuals who may fail to digest

more than moderate quantities of sugar or starch, sometimes one, sometimes both; there are also occasional individual idiosyncrasies about special articles or particular wines; but I have found these peculiarities to be exceptional. There are two physiological factors of dietetics which, I think, writers have been deceived into regarding as pathological. There are the habits, for instance. It is related by Mr. Frank Vincent, in his "Land of the White Elephant," that the river tribes of Siam and Cambodia carefully put away the fish they catch until they are somewhat decomposed, probably tasting like the

"Richness of a rank rabbit's tail,"

of which Pope speaks. Is it not probable that these Siamese and Cambodian stomachs have learned to digest these rotting morsels that would cause serious intestine warfare in a Caucasian? Would not such fish, then, be nourishment to the former and an emetic to the latter? In the same way the full diet that may be necessary to one living in a city, conducing to excellent health and digested without ache or pain, may produce serious digestive disturbance in some countryman who has never eaten a properly cooked meal in his life. In the same way a man who has taken coffee and rolls for breakfast for fifty years and a hearty meal at noon may be seriously incommoded by a hearty meal at breakfast and coffee and rolls at noon, although the total amount of food taken may be no greater. Then almost any one may feel temporarily better for a change from any kind of diet to any other kind, although ill effects may shortly ensue. When these sources of error have been removed, I think those who have sufficient material to study will perceive that lithæmics do best on plenty of well-prepared food in the greatest variety according to the seasons. I make great use of milk, because it is easy to obtain it pure and because most people can digest it. It should be understood that it may not be proper to put the patient on full diet at once after some acute outbreak. It may be necessary to have his stomach regain its tone, but the best way to do this is not to restrict the food but to make out some diet-list of plain food in moderate variety, and then increase this gradually until you let your patient eat anything he wants that is not too rich or cloying. If he have a good appetite, it should never be stilled as a guide. The strongest point prognostically for many lithæmics is that they have a good appetite, and it is meddlesome medicine to interfere with it. My experience has not been such as to lead me to think

that lithæmia is due to over-feeding or dietetic errors. On the contrary, I have never been able to trace a single case to over-feeding; and, while a certain number of my patients have been from among those who had good healthy appetites, the larger proportion of them have come from among people who were moderate eaters or irregular about their meals, or who had been living upon insufficient and badly prepared food of limited variety. The most potent ætiological factors in my cases have not been over-eating, but heredity, mental and physical fatigue, and worry. Although I can not go the same lengths as does Dr. Draper about the starches and sugars in the gouty, I can certainly affirm of lithæmics what he does of the gouty—that they digest nitrogenous food well. Nay, more, they need it. I let a patient of this class eat as much meat as he craves, especially brain-workers—as physicians, lawyers, and active men of affairs.

Alcohol had better be avoided altogether, although there may be cases when a glass of light claret may be permitted at dinner to those who have been accustomed to it for years. I have never seen any reason to interdict coffee and tea in moderation.

Other medicines than the above-mentioned laxatives and alkalies, combined with rest and proper food, are not relatively of much use in this affection. The bitter tonics may be serviceable. Quinine usually aggravates the trouble, as I have said. The iodides may be efficacious in some cases where the nervous disturbance is slight. When the stomach is in good order, phosphorus may act very well. I always use free phosphorus in solution as recommended by Ashburton Thompson, which is the most palatable of all the preparations. Dr. Da Costa recommends citrate of lithium; also zinc and arsenic.

Galvanization of the spinal cord is occasionally an excellent general tonic, but it must be done with large electrodes, well wet, and a battery that will furnish at least fifteen to twenty milliampères of electricity after passing through the average resistance offered by the human body when one electrode is placed over the cervical spine and the other over the lower dorsal vertebræ.

The Turkish and Russian baths can sometimes be employed with benefit in those whose nervous tone is not depressed. They must, nevertheless, be used very cautiously, and should neither be prolonged nor followed by such violent thumping, pinching, and joint-cracking as are dignified by the name of "massage" in these establishments. I give directions that the patients shall stay in the hot room only until the skin begins to act freely. When the perspiration comes

tardily, it may be well to first set the skin in action by a few minutes in the Russian bath. These baths are generally of less use in the acute cases than they are in those of persons who are merely suffering from lithæmic tendencies. But the rule should be imperative that they should not produce fatigue, either on the day when they are taken or the following day.

Dr. W. M. HUTCHINSON remarked that waters containing lithium were indicated on theoretical grounds. Pavy's copper test was unreliable for the estimation of sugar, because of the interference of other substances. It was better to estimate the urea.

Dr. JEWETT desired to know the result of mixing nitric and hydrochloric acids and letting them stand for some time.

Dr. ECCLES replied that he believed the only result to be a diminution of the nascent power. The strength increased for a few days after the admixture and then began to decline.

Dr. JEWETT thought that the nitric acid decomposed the hydrochloric acid and liberated chlorine.

Dr. HUTCHINSON said it was not a pure physical admixture, but he did not think chlorine was set free.

Dr. WUNDERLICH asked Dr. Gray if he considered that the larger amount of clothing worn in the spring as compared with that worn in the autumn prevented people from bearing an elevated temperature better at one time than at another.

Dr. GRAY answered that he certainly did, but the trouble was that change of clothing could not be made often and rapidly enough to suit the changing atmospheric conditions. In reference to Dr. Hutchinson's point, he would say that lithium was one of the best remedies at our command in treating these troubles, and especially was this true of the Buffalo Lithia Water.

Dr. WUNDERLICH inquired if Dr. Gray had tried cutting down the supply of water during meals with patients who were unable to digest meat.

Dr. GRAY never had, because in his experience large amounts of water were beneficial.

Dr. WUNDERLICH stated that it had been found a good plan to cut down the supply of water during meals and gradually increase it afterward.

Dr. GRAY said that Ebstein maintained that the desire for food was lessened by giving fat.

Dr. WUNDERLICH rejoined that Ebstein, however, did not hold his ground.

Dr. W. H. FARRINGTON had had a large experience with this class of cases, and was a marked example himself. He had seen in some a symptom not yet mentioned. He referred to an intense pain in one eyeball.

One case was of interest. A man of this class had muscular pain whenever he raised his arm a certain distance over the chest. No relief was obtainable, although it had been diligently sought in this country and in Europe. He came to the speaker and took Carlsbad water and was relieved. Afterward he had intense pain in the region of the anus. Good surgeons could not discover any cause. Carlsbad water again relieved him almost immediately. The case certainly was lithæmic, as shown by the urine. At one time it contained sugar, but only for a short time, without any other sign of diabetes.

Meeting of November 12, 1885.

The President, Dr. B. F. WESTBROOK, in the Chair;

Dr. A. H. P. LEUF, Secretary.

A Case of Fatty Placenta.—Dr. H. B. BAYLES reported a case occurring in a woman about twenty-eight years of age. She stated that she had been married eight years, having been pregnant seven times during this period, the result of these pregnancies being three premature labors and four at full term. Recounting in the order of occurrence, the first premature labor occurred eight months after marriage—an eight months' child which lived five months, dying of cholera infantum.

The second labor was at full term. The child lived four months and a half, dying of the same disease. The third labor was at full term. The child lived only two hours, and during that time it suffered from hæmatemesis or hæmoptysis, as the mother stated that the blood poured from the mouth and nose. The fourth child was born during the next year at full term. It lived eight months, dying of bronchitis. The next year the fifth was still born at full term. The sixth labor was premature, at the sixth month.

With this one Dr. Bayles was in attendance, the child, at birth, by its appearance, fully corroborating her statement as regards the period of utero-gestation. At this time the placenta presented the same conditions relative to the fatty change in its structure as did the specimen shown, and it was his intention to present the same to the society in lieu of better material, but, through the negligence of the nurse, it was not properly kept.

There was no difficulty after this mishap; but in due time she came to be relieved of obstinate vomiting, due, as he learned, to another attempt at reproduction. About two weeks ago he was again called to attend her in the seventh confinement, she stating that her "time was not up"; that another month was due the child. She remarked that she had been in very good health, suffering from no disorder; that the movements of the child were strong up to within two weeks, when all movement of the child ceased. He endeavored to hear the fœtal heart, but was unable to hear either that or the placental murmur. Nevertheless, labor progressed. Membranes protruded, and, as they were tough, he ruptured them; there was an abundant flow of amniotic fluid, until the head blocked the passage. After the expulsion of the child another gush of fluid occurred which thoroughly flooded the bed, and, while tying the cord, the placenta was expelled by uterine contraction, there being little or no hæmorrhage. The child, dead, seemed to be well nourished, and probably weighed six pounds. The flesh was firm, though, of course,

there was a swollen condition of the abdomen, mottled skin, and some exfoliation of the same on body and extremities; there was an abundant growth of hair, the whole condition of the child showing that nutrition had not been seriously interfered with until at a recent date. The patient recovered without any difficulty, though the "after-pains" were strong and persistent, and the secretion of milk marked.

The patient strongly averred that the placentæ previous to the last two were normal, and that there was no "peculiar" appearance as presented by the specimen exhibited, which was simply a counterpart of the one previous.

Referring to Cazeaux's work, he found that Tarnier relied mainly upon the researches of M. Robin for his description of the pathological changes, and, in addition, referred to the condition in these words:

"Obliteration of the placental cotyledons is without importance as regards the mother, but, as will be readily understood, may be highly injurious to the fœtus. It is, indeed, proved that an almost constant relation exists between the weight of the fœtus and that of the placenta. Now, in the case before us, any obliteration of the villi cuts off by so much the active portion of the placenta; if but few villi be obliterated, the child experiences no bad effects from it, but, if several cotyledons be altered, its development will be imperfect, and, should half of the organ be invaded, its life will be in the greatest danger. In a still more advanced stage its death is almost certain."

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As regards the ætiology and treatment, he continued thus:

"All our knowledge of the fibro-fatty degeneration of the placenta is, so to speak, condensed into the anatomo-pathological statement just given, and we are obliged to confess, as does Dr. Millet, whose excellent work may be consulted with advantage, that there is nothing to give us light upon the ætiology of this lesion, no sign which enables us to fix its symptomatology upon a certain foundation. Sometimes patients had complained of weight or pain in the loins. The symptoms then resemble those observed in cases of placental apoplexy, and, we would observe, are really so vague or even insignificant that it would seem to us almost impossible to diagnose the fibro-fatty degeneration in a case of first pregnancy. As, however, the affection is liable to recur and sometimes adheres tenaciously to the same woman in all her pregnancies, the accoucheur may take warning and let the least trouble, occurring either to the mother or fœtus during gestation, have its weight in his estimate of the situation. M. P. Dubois says, in reference to these matters, that, if a sense of dull pain and fullness is connected with a slight diminution of the motion of the fœtus, there is reason to fear that it is in serious danger. It is possible, then, to suspect or even to foresee the fibro-fatty degeneration of the placenta; but how shall it be prevented?

"What course shall be pursued if the woman becomes pregnant again? M. Dubois's advice to his pupils, under the circumstances, is thus briefly stated by Dr. Millet: Advise the patient to avoid all kind of fatigue;

insist upon her lying down, and prescribe a light diet, for the purpose of moderating the circulation. At the same time practice a revulsive bleeding to the extent of from one to two ounces, followed the day after by a similar one. In connection with this apparently reducing treatment, M. Dubois, without fear of being taxed with inconsistency, adds the use of iron, inasmuch as it has appeared to him that women are predisposed to the affection by a certain degree of impoverishment of the blood. The iron would, at any rate, seem in several instances to have benefited the patients."

In conclusion, Dr. Bayles stated that, after the occurrence of the first fatty placenta, the result of the sixth pregnancy, he placed the patient on tonic treatment—*i. e.*, dialyzed iron, with instructions that it be taken for a long time, as the woman was rather anæmic; how long she actually did take the medicine he could not say; and whether the gain of two months in the last pregrancy, accompanied by fatty placenta No. 2, was due to a more careful attention to herself and the tonic treatment, he was not prepared to state.

Perforating Gastric Ulcer with Intense Peritonitis without Symptoms.—Dr. George R. Westbrook stated that Mrs. C., aged forty, Ireland, married, consulted him in August, 1885, complaining of symptoms suggesting a chronic gastritis. He saw her twice after that, the last time September 24, 1885, when she expressed herself as much relieved.

The following history was obtained from her friends: On the evening of October 28, 1885, she complained of severe pain and cramps in the abdomen, was very restless, would not lie on her bed, vomited blood, and finally got on her knees on the floor, resting her abdomen across a low chair, and died in that position, about four hours after she first complained of pain and cramps. Her family, not realizing her dangerous condition, had not called a physician.

During the day on which this attack occurred she had felt as well as she had at any time during the past two months, and in the afternoon had been out making some household purchases, and it was on her return from this shopping expedition that she was taken ill.

At the autopsy, made fourteen hours after death, Dr. Leuf and Dr. Eccles being present, a perforation on the anterior aspect and near the pyloric end of the stomach was found. There was an intense general peritonitis, the parietal and visceral layers of the peritonæum being intensely injected and covered with a recent exudate.

The kidneys were small but normal. The liver fatty. The thorax was not opened.

Dr. Eccles remarked that not sufficient stress had been laid upon the intensity of the peritonitis; it was very great.

Dr. Leuf recalled a case that had been examined by him in the deadhouse of St. Mary's Hospital. It was the body of a woman who had been shot in the abdomen. The ball entered a little below and to the left of the umbilicus, and extended downward and slightly backward

several inches between the belly-wall. Then it had entered the peritonæum and cut its way through the right side of the transverse colon and five coils of intestine, making ten openings in all, to crush and fissure the inner surface of the left pubic bone. The peritonitis in this case was suppurative and of the intensest kind. Only eighteen hours elapsed between the reception of the wound and the death of the patient. This case also demonstrated how rapidly the severest kind of a peritonitis might develop.

Mitral Stenosis; Cardiac Aspiration.—The PRESIDENT presented the heart removed from the body of a man upon whom cardicentesis had been practiced. The patient, a printer, aged thirty-five years, was admitted to St. Mary's Hospital on the 30th of October. Upon his arrival he was extremely short of breath and cyanotic. There was well-marked dropsy of the lower extremities, extending upward to the middle of the thighs. The face and neck were swollen, and the veins turgid. The pulse was very rapid, feeble, and irregular. The extremities were cold. The patient was considered moribund. Owing to his great weakness and to the stupor resulting from the accumulation of carbonic acid, it was impossible to get a complete history, but it was learned from his friends that he had suffered from rheumatism and heart disease for about four years, and had worked at his trade until six months ago.

Dr. John Horn, the senior house physician, administered digitalis, with ethereal and ammoniacal stimulants, at frequent intervals, but with no result. He then gave a grain of cocaine hypodermically, and, as no relief was obtained, one one hundredth of a grain of nitro-glycerin was given and repeated at short intervals. On the following day the patient was seen by the president and Dr. Platt. He was in the same condition as on his admission, except that the stupor had deepened into coma, and the radial pulse had almost entirely disappeared. It was found that the lungs were congested and œdematous. The heart was dilated; epigastric pulsation well marked; apex in the fifth intercostal space beyond the nipple. A systolic bruit was heard over the apex, and transmitted into the axilla. The aortic second sound was inaudible, being entirely obscured by the respiratory sounds. The pulmonic second sound was accentuated. The president made the diagnosis of mitral stenosis, and decided, as a *dernier ressort*, to withdraw some blood from the right side of the heart. The needle next to the smallest of the Codman & Shurtleff aspirator was introduced through the third intercostal space, hugging the right border of the sternum. Eighteen ounces of blood was withdrawn.

During the operation the radial pulse improved somewhat, and this improvement continued for half an hour. Toward the close of the operation the patient regained consciousness. The respiration was easier and the color somewhat improved. But, after an hour, he sank again, and died seven hours after the operation.

At the autopsy, which was made by Dr. A. H. P. Leuf, the lungs were

found congested and œdematous. The pericardium contained nineteen ounces of bloody fluid, most of which was probably blood, as there had not been sufficient pericardial effusion to give any physical signs during life. The sac was not, however, distended. The needle had entered the right auricle where it begins to narrow toward the auricular appendix. The orifice made by the puncture was still visible, and pressure upon the heart, while *in situ*, caused a little oozing. The auricular wall was very much attenuated from long over-distension. All the cavities were dilated —the left ventricle least so—and the mitral orifice was contracted so as to admit only the tip of the little finger. All the abdominal organs were greatly engorged, as is usual in mitral stenosis.

The president said that the result in this case was interesting in that it seemed to cast some gloom over the future prospects of the operation. It would not be wise, however, to abandon the procedure on the unfavorable outcome of a single case. It should be remembered that in his first case the orifice of puncture could not be detected after the most careful examination. This was also the case in an instance that had occurred since, in which Dr. Dority, the house physician, had punctured the auricle just before death. In the present instance the dilatation of the auricle was excessive, and the muscular tonus entirely lost. Had the operation been done a week before, there would, probably, have been a firm contraction and closure of the orifice after the withdrawal of the needle. The factor which tended to cause dilatation of the orifice was the want of relation between the heart and thoracic wall. The needle being held firmly by the thoracic wall, the movements of the heart tend to enlarge the opening. This was one of his reasons for choosing the auricle for aspiration, as its movements are not so free as those of the ventricle. Possibly, however, the greater thickness of the ventricular wall would more than outweigh the disadvantages arising from its free movements. He thought of having a flexible needle constructed, which would move with the heart and so not tear it.

The following paper was then read:

SOME SERIOUS SOURCES OF ERROR IN STUDYING THE COURSE OF DISEASE.

By ROBERT G. ECCLES, M.D.,

BROOKLYN.

The static side of pathology or pathological anatomy usually monopolizes most of the time and attention of such societies as ours. A little wholesome variety like that about to be introduced to-night may contribute to our welfare by saving us from surfeit. Dynamic pathology is usually left to general practitioners to work out as best they may. The design of this paper is to point out the pharmacolog-

ical factors that tend to make our efforts at induction so often valueless while studying disease in its active course. This must necessarily wheel us off into the consideration of questions that may seem to be quite remote from the work of this association. None of the points about to be presented deal with any special disease, but they are all in a broad sense germane to the function we have assumed, and have a marked influence on maladies both trivial and serious. Pathology has been defined as abnormal physiology and variation from the health-line chosen as the measure of disease. The definite tendency that this variation seems to possess for each has been called its natural history. Patients are never willing to trust their unaided vital energies to a combat with disease, and, as a result, this history is rather imperfect at its best. An approach toward accuracy has only been possible by knowing the physiological value of the remedies taken and eliminating this from the total effects. The ideal line thus established marks the maximum variation from health due solely to the disease. The physician's duty is to keep his patient as much as possible within this line and as near to that of health as he can. To go beyond it is malpractice. That the sick have been made worse by injudicious drug administration no one can deny. That they are not always benefited as much as expected by medicine is equally clear. In fact, so unfortunate have some physicians been in this respect that downright skepticism has taken possession of them. There are times, perhaps, when the best of us wonder whether we are not stealing credit from the conserving forces of life and giving it to the drugs prescribed. That such doubts should arise is far from surprising to any person who has studied into the grave difficulties that lie between our prescriptions and patients. If faulty diagnosis precedes these, the climax is capped. The patient will fare worse than if he had refused all medical care. Had all that the most sanguine medical zealot ever alleged for any drug been true, yet would its virtues fail of realization in a large majority of cases, because of the existing conditions about to be pointed out. It is not necessary to dwell long upon the exasperating tricks of nurses and friends. Orders are forgotten or neglected; domestic remedies supplement our own, and sometimes even supplant them. If opium or liquors are given, the chances are that a meddler has advised an identical article, and there is double dosing. When depressants are prescribed, some fool neutralizes the desired effect by a stimulant, and *vice versa.* The great number of such cases would startle us if we could discover them all. By pharmacists importuned for advice they

are heard of much oftener than by physicians. From just such cases most blame comes, revealing the extreme inconsistency of average human nature. But we need not dwell upon these. The dispensing of the medicine we order is of still greater importance, and demands our constant care and persevering vigilance if we wish to procure what we prescribe and as we prescribe it. In every community there are dishonest men, and some of them crawl into every craft and profession. The pharmaceutical charlatan is the physician's most dangerous foe. The rattle of excessive advertising gives us a cue to his whereabouts very often. A druggist who will sell tartrate of sodium, on a solemn unasked-for guarantee, as liquor magnesii citratis, and put up a prescription calling for an article having no earthly existence, will not hesitate at any measure calculated to increase his own revenue, whatever the effect may be on others. On the main thoroughfare of our city can be found a druggist who has done these things. What can be done? If we tell our patients that they must go to a certain druggist in whose integrity we rely, the implied suspicion of taking commissions will injure us. We, however, owe it as a duty to our profession, ourselves, and the sick, to tell those intrusted with procuring the medicine that they must not go to a shop where evidences of dishonesty or incompetence exist. If they do, of what avails a careful diagnosis, and of what value your judgment upon the case, where remedies are being imbibed whose therapeutic worth is totally unknown? From the extreme case cited there are many degrees in which fraud appears. Some rogues' consciences are more tender than others. Some, in fact, are so tender that they are but a shade removed from the honest. They would not think of complete substitution, but are perfectly willing to palm off inferior articles of insufficient strength. Unfortunately, this class is quite numerous and much more difficult to detect. The careless and ignorant swell the number and produce results which are identical so far as our relations toward them go. When in some articles it is the exception rather than the rule to get what we order, it is about time something was done by way of improvement. With so important an article as tincture of opium, Dr. Davenport, chemist of the Massachusetts Board of Health, found only twenty samples out of one hundred up to the standard of the Pharmacopœia.* Lack of time forbade an examination of as many samples for Brooklyn, but the few tested showed a similar state of affairs here. A preliminary examination of some

* "Pharm. Rec.," vol. v, p. 25.

samples of nux-vomica tincture indicates a considerable lack of uniformity in this article also. The examination in Massachusetts showed that not only tinctures, but many other drugs, were in the same condition. In citrate of iron and quinine, thirty-four out of forty samples were short in quinine. Eleven out of twelve of jalap, six out of ten of creasote, ten out of ten of bromide and iodide of potassium, and twelve out of fifteen of precipitated sulphur, were below the pharmacopœial requirements. Dr. Wall reports in the "Southern Pharmacist" * that, of seven samples of male fern obtained from as many different wholesale houses, only one was male fern. He declares that he has seen large quantities of so-called red cinchona, jalap, and coto-bark that were sold all over the country for genuine articles, yet which contained no trace of the substances whose names they bore. Powdered cedar-wood, flavored with oil of cinnamon, is sold for powdered cinnamon. Exhausted powdered drugs, from which all the active principles have been extracted, are sold over again to ignorant and unsuspecting druggists to make tinctures from. They are bought upon the plea of economy, and they either have not time or do not know how to detect the fraud. What sort of tinctures can be expected if we add to these the inability of so many to exhaust the best of drugs when they undertake to percolate them? Is it any wonder that a case should lately have been related from Minneapolis, Minnesota, † of a Mr. Charles Johnson, who was given by mistake an ounce of tincture of aconite-root, and, after consuming it all within twelve hours, suffered no evil consequences? Last month a paper was read at a State pharmaceutical meeting in which it was shown that, of the pepsin manufactured by twenty different houses, all fell short of the pharmacopœial requirements. ‡ Where fifty grains of albumin should have been dissolved among the saccharated samples, the range was from nine to forty-five. With the scale pepsin, the best dissolved one hundred and fifty grains to the grain, and the worst only eighteen. These are sold all over the country, and Brooklyn comes in for its share. This state of affairs is bad for all physicians, but none are so likely to suffer from it as the most skillful and conscientious. They take enough interest in their patients to press a remedy until it produces the desired effect. They are not fettered like slaves to the book's decrees. Becoming accustomed to large doses of a remedy they have proved weak, they, without knowing it, become hazardous pre-

* "Pharm. Rec.," vol. v, p. 45. † *Ibid.*, p. 85.
‡ *Ibid.*, p. 372.

scribers. Somewhere they are sure to strike an honest, competent, and reliable pharmacist, and, if they then insist upon the dispensing of an ultra-maximum dose, the consequences may prove the reverse of pleasant. How often do our patients perish in this manner, and the disease take the blame?

It may now seem to you that, after pointing out so broad a field of pitfalls for our minds in seeking inductively the course of disease, the subject must be exhausted. We have glanced at the deceit and carelessness of nurses, dishonesty in all degrees of pharmacists, adulterations and substitutions of manufacturers, and the incompetence of dispensers. We next come to the downright carelessness of those who handle and look after the remedies. Articles of unquestionable value as therapeutic agents are being condemned to unmerited neglect. One day they give us surprisingly good results, and another they fail totally and in the most unaccountable manner. The failures running far beyond the successes, they are given up in disgust. There is a long list of this kind, but the most conspicuous at present is spiritus ætheris nitrosi, or sweet spirits of niter. A few men in England and America have lately striven to save this article from total neglect by showing how to preserve its valuable qualities. In an article upon the subject, read before the Kings County and New York State Pharmaceutical Societies, your essayist made the following bold statement without fear of contradiction: "*It is the merest accident if a physician gets what he orders in any part of the United States when he writes for an ounce, or any other definite amount, of spiritus ætheris nitrosi.*" * After the facts had been pointed out, they at once passed a resolution insisting upon proper precautions being pursued in its preservation. Since then a number of Brooklyn shops, and, no doubt, others throughout the State, have adopted the reform. The number here and in New York city is as yet very small—perhaps less than twenty in both places. A few have boldly declared that they would not do it, as the trouble was too much for them. It is always hard to turn men out of fixed habits. But what is the fearful burden sought to be imposed upon them? Nitrite of ethyl, the active agent of sweet spirits of niter, boils at 64·4° F., and yet they will persist in keeping it in large bottles upon their shelves, where the temperature is above this point. They are asked to keep it in small bottles, closely corked, and in a cold place. One of these at a time can be opened and dispensed from. On all prescriptions calling for this article, that

* "Transactions N. Y. State Phar. Assoc., 1885," p. 248.

are dispensed where such precautions are not taken, you get nearly pure alcohol, with a little acetic acid, instead. When you dispense this with iodide of potassium, your patient is poisoned with free iodine released by the acid, unless the dispenser takes pains to add some alkali to make it neutral. Even then remedies are imbibed upon which you make no calculation, and your calculations are thwarted. The toxic symptoms of the free iodine, where not neutralized, are taken as unexpected phases of the disease. You tell your gonorrhœa patients to avoid liquor, as contra-indicated, and yet you prescribe it in almost double the usual strength under the delusive name of spiritus ætheris nitrosi, or dulcis. Out of thirty-one samples assayed by me last spring, not one came up to even one half the standard (four per cent.), and most of them were procured from first-class shops. Only five reached one per cent. If the shops were bad, the hospitals were worse. The very best of four samples, from as many Brooklyn hospitals, only gave a small fraction over one half of one per cent., and the poorest was as low as one tenth. Good spirits of niter is in daylight of a pale straw-color. That found in most shops is of this color for only about twelve hours after being put in a fresh condition upon the shelves. Three times opening of a large bottle reduces it to less than a quarter its strength, and fades the color to that of alcohol. Allow me to assay before you two samples, one put up two months ago, but protected as advised; the other as purchased to-day at a Brooklyn shop. You see the large amount of nitrous-oxide gas derived from the good sample, and the insignificant quantity given by the poor one. This instrument is called a nitrometer. Into the top and through the glass cock the various solutions are passed, after the two arms have been filled with mercury, or, as now, with saturated chloride-of-sodium solution. The 5 c. c. of solution of KI went in first, 5 c. c. of spirits of niter second, and 5 c. c. of dilute H_2SO_4 last. The reaction is $2KI + H_2SO_4 = K_2SO_4 + 2HI$. The hydriodic acid next acts upon the nitrite of ethyl, releasing alcohol, iodine, and nitric oxide: $C_2H_5NO_2 + HI = C_2H_6O + I + NO$. The nitric oxide, unable to escape, is measured in the closed arm when properly balanced. To determine the per cent. value in nitrite of ethyl of any volume of NO gas, the following calculations are made: The molecular weight of nitrite of ethyl ($C_2H_5NO_2$) is $12 \times 2 + 1 \times 5 + 14 + 16 \times 2 = 75$. The molecular weight of nitric oxide (NO) is $14 + 16 = 30$. Seventy-five parts by weight of ethyl nitrite will, therefore, evolve thirty parts by weight of nitric oxide. Thirty grammes of nitric oxide, under ordinary con-

ditions, measure 23·55 c. c. Therefore, as 23·55 is to 75 grammes, so is the volume of the gas to the weight of nitrite. Now, as the weight of the sample is to the weight of nitrite, so is one hundred grammes to the per-cent. weight in the sample. The weight of the sample is its specific gravity at 60° F. multiplied by its volume. Here is an analysis of two samples: A is from the original package, B from the shelf-bottle of a neighboring shop, after standing on the shelf seven days.

SAMPLE.	NO gas.	Specific gravity.	Per cent. Et NO_2.
A.....	29·2	·825	2·25
B.....	15	·822	1·16

In just one week this druggist had lost one half the nitrite of ethyl from his bottle. He might almost have done as well with carbonic-acid water exposed to the same conditions. Remember that both were originally from the same bottle. Other volatile agents receive about the same treatment in many shops. Spirits of Mindererus, or liquor ammonii acetatis, that should not be kept at all, but made extemporaneously when called for, can often be seen standing in a stock-bottle. When freshly made, it should tend to check nausea and be pleasant to the taste. Kept on the shelf, it would almost make a well man vomit. There are druggists in Brooklyn who, to make lime-water look clear, expose it to the carbonic acid of the air by filtering, and often render it almost worthless. Syrup of the iodide of iron, by exposure to air, changes into inert oxide and sets free iodine. If kept away from bright light, this change is rapid. By being preserved in small bottles and kept in or near a window, it shows no signs of such change in a year. Easy, therefore, as the protection is, an occasional druggist is known to dispense the decomposed article, and still others keep it by adding hyposulphite of sodium or other oxidizing agent, thereby altering its properties. When decomposed, the iron is inert and the iodine excessively active. Under such circumstances is it not clear that our best-laid plan for the welfare of the sick must often abort, and our scientific study of the disease become utterly impossible? Cod-liver oil, like the syrup of the iodide of iron, is also decomposed by air, but it must be preserved in the dark. When fresh, it is not the disgusting stuff we all consider it. To its careless handling is due much of the trouble our patients have in taking and retaining it. There are many other articles that lack of care alters the chemical

nature of through the action of air or light, and, while neither time nor space can now allow of their enumeration, one more must be mentioned because of its great importance. Calomel, if exposed long to light or organic substances, changes into corrosive sublimate. When violent symptoms succeed its administration, it is well to remember this fact.

The pictures before you represent another source of confusion and trouble to us in prescribing. These are drawings of plants enlarged from microscopic views. They play an active part in inducing artificial and sometimes alarming symptoms. Aqueous solutions, syrups, aromatic waters, and some dilute acids constitute their natural habitat. Abscesses formed after hypodermic injections, augmented conjunctivitis after the application of supposed soothing collyria, free emesis after imbibing medicines designed to allay gastric trouble, and increased diarrhœa following remedies calculated to arrest the same, are a few of the symptoms of their presence. Mistura cretæ made from infected cinnamon-water has been known to make summer complaint in children violently worse. In hot weather many aromatic waters, unless kept under special precautions none pursue, spoil in less than three weeks. A large proportion of druggists keep them several months, and believe that the paper filter makes them clean and good again. This is a delusion. Boiling would do the work for them if they would take the pains. The best plan is to redistill. Nearly every compound syrup of the hypophosphites upon the market, acid phosphate and dilute phosphoric acid, undergo the same change. If we specify a certain make, our chances for securing infected goods are increased. By ordering those of the Brooklyn and New York formulary, that is now indorsed by all the pharmacists of the nation, we are more certain to get a fresh article, as well as one whose exact composition is known. This formulary should be known by every physician in the United States, and, instead of ordering syrups whose make-up is a mystery, and elixirs of impossible composition, he would know how to secure reliable articles of unquestionable therapeutic value. Why specify any man's make of anything? If the druggist is honest, he will provide articles of full pharmacopœial strength or none. What more do you want? If he is dishonest, your specification has no more weight with him than a floating feather. It drives your prescriptions from the shops of honest men who happen to be without that brand, and increases their chances of falling into the hands of the dishonest, who will dispense any brand that suits them. A physician at 10 P. M., November 2d, prescribed some ela-

terium pills, specifying Squibb's. A few minutes' time in any shop would have procured a freshly made article. So seldom are they called for that the chances were one thousand to one, if they had been found, they would have been four or more years old. At 1 A. M. twelve shops had been visited and the search given up in disgust. Had a dishonest man been met with, the prescription would have been filled. But how? Is it not a very lazy way to write a prescription? Either you know the composition of the thing ordered or you do not. If you do not, it is the act of a quack to order it. If you do, then give your formula in full and in proportions to suit the conditions of your patient. Ready-made coats may be selected to fit, but ready-compounded medicines are scarcely scientific. They neither fit, nor are they likely to be fresh. In almost every instance their pretended formula is a mere blind, and no man can put up the same thing from it. In fact, they as good as tell you so when insisting upon your specifying theirs and warning against imitations. If they have told you the truth, what is the good or sense of imitation? An article prepared according to their formula should be identical with their own goods, except for being fresher. The fact is, these are nearly all secret remedies, like the ordinary so-called patent medicines, and only differ from the latter in being pressed forward by more glaring falsehoods and greater assurance. The advertisement of the plebeian article tells us that it is found in all first-class drugstores, when perhaps not one in ten ever heard of it. The aristocratic one declares that his secret nostrum is not a secret nostrum at all, and that it is used in all first-class hospitals and dispensaries. He even goes so far sometimes as to give the names of these institutions on the strength of having sent them free samples, which probably have been consigned to the garbage-box. The former gives long lists of clergymen and politicians who have tried and indorsed it. The latter gets a lot of indorsements that are paid for in cash, others in free advertisements in their free literature. These usually begin in this sort of style: "From John Jones, A. M., M. D., F. R. C. S., Consulting Physician to the Sandwich Island Hospital College; Physician to the Honolulu College Dispensary; Member of the Oceanic Medical Society; Member of the Pathological Society," etc. Here is a pamphlet containing indorsements of this kind from four Brooklyn physicians with just such a tail to their kite of vanity. Had they read the statements as to the nature of the remedy, they must have known they were being duped. One ingredient grows in the Southern States, another in Honduras, and the rest are common

weeds and a tree growing around us. They allege that the remedy is put up in the green state under the inventor's supervision, when common sense tells us that two at least must be from the dry plant. The proportions are kept secret for fear some one else should try to make it. Why not prescribe the articles, which are all official, and get the preparation fresh? In this city almost any pharmacist could put it up at much less cost. Prescribing secret remedies is rank treason to science, and to all the honored traditions of our profession, no matter how eminent they may be who set us the example. The common method of prescribing ready-made pills is another one that injures our success. Even though simple articles, honestly put up, they soon become so hard and dry they pass through like a stone. My experience, after purposely testing their use for three years, condemns them. Goods not a week out of the manufacturers' hands have time and again passed through undissolved. Besides this, the question has been raised concerning the connection these bear to the deteriorated goods that manufacturing jobbers are unable to get off their hands. No source of outlet can be discovered, and it was seriously hinted at the National Pharmaceutical meeting that they were utilized in compound pills. In an analysis of 1,000 prescriptions written last spring by more than one hundred physicians of our city, out of 357 kinds of ingredients ordered, 34 kinds of proprietary articles were named. Nearly ten per cent. of the substances used in Brooklyn practice are of unknown therapeutic value to the physician ordering, if he gets what he calls for. It is bad enough to be fooled by ignorance and dishonesty in others, but it is worse to be fooled by blindly following quack advertisements. Even if good results were obtainable by using such goods, it must paralyze progress in our profession to do so. You do not know and can not discover whence the benefit is derived. Besides, this excuse must compel you to prescribe every quack remedy. They all possess some therapeutic value. The only honest course for the physician to pursue is to order remedies that possess nothing occult or secret. If he can not now discover the rogues among the pharmacists that make even his own prescriptions occult, combined effort on the part of medical societies will do it.

It should be the work of the Kings County Medical Society (aided by this), as it is certainly the duty of that body, to organize committees for every ward in the city, whose function should be the testing of druggists and reporting the dishonest and incompetent, so that all might know them. It is their duty, because it is a mere act

of self-preservation. Not one member of such committees need enter a drug-shop to do this work. The examination of their prescriptions from time to time in a proper and systematic manner will give all the needed facts. Such a course would rapidly lower the death-rate by putting into our hands reliable weapons for combating disease. When druggists discover that physicians are watching them in such a manner, they will strain every nerve to improve matters. So long as the physician himself is careless, none but the honorable in their ranks care.

A watch upon the pharmacist will tend to save us in many directions, but it can not supplement our own ignorance of facts we should certainly know. Only the other day a prominent practitioner in this city told me that he was not aware that since 1880 laudanum had been eleven per cent. stronger than it had been previous to that time. Had he prescribed a maximum dose by the old standard, assuring the druggist that he was right and would take the responsibility, where would he have been? Powdered opium must assay from twenty to sixty per cent. more in morphine strength than it did. The last Pharmacopœia made many changes that every physician should remember, or, not having discovered, be taught. The revisers of that work have aimed at approaching a common standard for all drugs of a kind. With tinctures they seek to reduce the number of strengths to four. These are five, ten, fifteen, and twenty per cent. by weight. Had they made but two—viz., ten and twenty per cent.—the results in the long run would have been better. They avoided a too radical and sudden change, and facts confirm their wisdom in doing so. As matters now look, it will take a century for some medical men to discover that any change has occurred. Where a decrease in strength has occurred, the dose must be increased accordingly, and where there is an increase in strength it should be lowered. With fluid extracts the danger of fatal mistakes because of the change is impossible. They are all weaker by five per cent. One hundred grammes of the crude drug now make one hundred cubic centimetres of extract. It is to be hoped that when another change occurs the per cent. will be taken from the active medicinal constituents, and not the weight of drug used. As it is hard to get two samples of the same drug having the same therapeutic value, a constant difference in effects must be experienced in spite of the present delusive uniformity. The following table, by A. L. Belleville, Ph. G., from the "Pharmaceutical Record" of February 1, 1883, gives the increase and decrease per cent. of strength

of preparations as made according to the fifth revision, or 1870, and the present Pharmacopœia (1880):

	Decrease in Strength.	Increase in Strength.
	Per cent.	Per cent.
Acetum lobeliæ	23	..
" opii	38	..
" sanguinariæ	23	..
" scillæ	23	..
Acidum aceticum	..	3
" " dilutum	..	33
" hydrochloricum dilutum	..	28
" nitricum dilutum	14	..
" phosphoricum dilutum	..	2
" sulphuricum	4	..
" " dilutum	17	..
" sulphurosum	45	..
Alcohol dilutum	..	17
Confectio sennæ	..	20
Extractum aconiti, 1870, leaves. 1880	..	Root.
" conii alcoholicum, 1870, leaves. 1880	..	Fruit.
Ferri et quininæ citras ... quin.	25	..
Liquor acidi arseniosi	..	15
" ferri chloridi	..	11
" potassæ	14	..
" potassii arsenitis	..	15
" sodæ	12	..
Opii pulvis	..	20–60
Opium	..	12·5
Opium denarcotisatum	..	..
Spiritus anisi	..	47
" camphoræ	28	..
" cinnamomi	..	25
" juniperi	..	50
" lavandulæ	..	50
" menthæ piperitæ	..	56
" " viridis	..	56
" myristicæ	..	50
Tinctura aconiti	16	..
" aloes	..	22
" " et myrrhæ ... āā	17	..
" arnicæ florum	13	..
" asafœtidæ	..	25
" calumbæ	33	..
" cannabis	44	..
" cantharidis	..	42
" capsici	..	42
" catechu composita	..	71
" cinchonæ	20	..
" conii, 1870, leaves. 1880	..	Fruit.
" cubebæ	33	..
" gallæ	..	25
" guaiaci	13	..
" " ammoniata	13	..
" humuli	..	14
" lobeliæ	..	25
" myrrhæ	..	67

	Decrease in Strength.	Increase in Strength.
	Per cent.	Per cent
Tinctura nucis vomicæ	45	..
" opii	..	11
" " deodorata	..	11
" quassiæ	..	67
" rhei	..	20
" serpentariæ	33	..
" stramonii	33	..
" valerianæ	..	25
" " ammoniata	..	25
" veratri viridis	9	..
" zingiberis	27	..
Unguentum acidi carbolici	17	..
" " tannici	..	67
" belladonnæ	17	..
" gallae	17	..
" hydrargyri ammoniati	..	25
" " oxidi flavi	..	25
" stramonii	17	..
" zinci oxidi	..	25
Vinum ergotæ	..	20
" opii	23	..
" rhei	28	..

The changes in the aceta, dilute muriatic and dilute nitric acids, liquor acidi arseniosi, liquor potassii arsenitis, opium, tincture of aconite, tincture of cantharides, tincture of nux vomica, tincture of opium, and tincture of veratrum viride are probably the most important. Tincture of aconite-root has changed its name to plain tincture of aconite without the root. This change in name may cause trouble with physicians who have never used the word root when ordering it. Before the revision they probably invariably got the tincture of the leaf. The difference, however, can be but little, as the official tincture is now sixteen per cent. weaker than it was. It is customary for pharmacists to dispense the weaker of two preparations when the doctor fails to distinguish between them. When vinum colchici is ordered, the wine of the seed, being the weaker, is the one given. To get the wine of the root you must write radicis. When in chemicals a similar doubt is left, there is no such short way out of it. Then the doctor must be consulted or the most commonly ordered one given. Ordering sodii sulph., the -ate salt may be supplied when the -ite was intended. With iron the subsulphate may be given for the tersulphate. With potassium there is a choice between the -ate, the -ite, and the -ide salts, all of which are official. With magnesium, the -ate and the -ite bother.

Reviewing all the chances for error, fraud, accident, and deteriora-

tion of medicines, is it not really wonderful that our results are as good as they are? How can we expect anything but doubt and confusion with such a state of affairs? Are they not all serious sources of error to every pathologist who faithfully tries to study the course of disease? How long shall we stand passively by and allow matters to continue as they are when we have the remedies in our own hands? "Physician, heal thyself," and heal the social diseases that limit your sphere of usefulness in so marked a manner. Some Brooklyn physicians have proposed as a remedy for a number of the ills enumerated to-night that physicians keep and dispense their own drugs. Allow me to say, gentlemen, that this will be jumping from frying-pan to fire. The Committee on Adulterations and Deteriorations, of the Pennsylvania Pharmaceutical Association, in their last report proved beyond question that physicians who prescribed their own drugs suffered a hundred-fold more than those depending upon the pharmacist. Sour syrups, fluid extracts that were not good tinctures, and badly prepared articles were the rule. Physicians have neither time nor training in this field to escape either imposition on the part of wholesalers or incompetence in themselves.

W. P. DeForrest, being called upon, said that he was not a doctor. He always told his customers so when they entered his drug-store under such an impression. The paper had interested him. He would only say that druggists were not careless as a class. As a rule they were painstaking and careful. There were black sheep in all families. Also among druggists and physicians. He thought the druggists of Brooklyn were competent, and willing to be honest. There were many things to tempt them to do wrong. Shelves were filled with bottles of drugs that were seldom prescribed. This was invested capital yielding no interest. It led to substitution. The proper remedy was in the hands of the doctors, who, alth ough they gave a willing ear to the paid agents of manufacturers so as to be influenced by them into ordering a special make, yet they did not deem it proper to order proprietary remedies. Such work should be terminated. With few exceptions, only pharmacopœial preparations should be ordered, and even these were too numerous. Nearly two years ago fifteen druggists—five from Brooklyn and ten from New York—met to combat this evil. They did the best they could as a remedy. He was one of the fifteen. The result of their work was the little book known as the "New York and Brooklyn Formulary." This contained everything required that was not in the Pharmacopœia. Everything admitted to this book had been carefully considered. He believed the formulæ a fine collection. The compound syrup of the hypophosphites made by Fellows was the best and most reliable. One well-advertised specimen of this preparation failed to show any quinine or nux vomica

after a careful analysis. This preparation was found in the book of formulary, and contained all its proper ingredients in the right proportion. He hoped the society would do all it could to help the druggists combat the evil brought out by the paper of Dr. Eccles.

Dr. J. A. McCorkle did not come to speak, but he would express his appreciation of the value of the paper and say that it had interested him. From it he had learned many things of which, up to a certain extent, he had previously been ignorant. He would illustrate from his practice. Four or five years ago he was called to see a girl four years old; she had an eruptive fever. He prescribed sweet spirits of niter at the eruptive stage. The patient was comfortable until beginning to take the medicine. He had given it to act upon the skin with a febrifuge effect. It was taken every two hours. He was called up at night and found the child very restless and delirious. He was at a loss to account for all the trouble. The medicine was stopped and the child at once began to get well. He now believed the child had been drunk and that the sweet spirits of niter were the cause, as it probably was nearly pure alcohol, and that this acted powerfully on the hot blood. He also did not favor prescribing the preparations of special manufacturers. It was best, with a few exceptions, for to adhere to the Pharmacopœia. He had used a special make of hypophosphites, and often failed. The so-called "family pill" that never dissolved was one of the disagreeable outcomes of factory-made pharmaceutical preparations. Old opium pills were sometimes good if it was desirable to have them gradually dissolved and absorbed as they moved along the intestinal canal. Quinine pills often got dry, and hard to be thrown off just as they were ingested. This was true of one drug, and might be so of many others.

Dr. Sherwell congratulated Dr. Eccles on his scathing remarks about substituting druggists. He seldom wrote for non-pharmacopœial preparations. He never wrote for an emulsion without giving the formula. He had suffered seriously from substitution. It also seemed to him, from talks he had had with druggists, that they were generally superior in intelligence and integrity to physicians. He felt safe in saying this in an average way as an average man.

The President asked if the "New York and Brooklyn Formulary" now contained anything equivalent to any of the compressed tablets made by some manufacturers.

W. P. DeForrest replied that it did not, and probably would not, as they were not proprietary. He believed that they would be left alone.

Dr. Eccles remarked that some of the troches were not as represented. Specimens of quinine and chocolate were tried by him, but he could not taste any quinine. The representative of another house said it was a tannate, and, if so, it could have little or no value.

The President stated that he had tried some, and, although he could not taste the quinine at first, he could a little later.

Meeting of December 10, 1885.

The President, Dr. B. F. WESTBROOK, in the Chair;

Dr. A. H. P. LEUF, Secretary.

A Case of Pulmonary Abscess.—The PRESIDENT presented a lung from a case of chronic pulmonary abscess which had been treated with the pneumatic cabinet. The patient was a man twenty-eight years old, of American birth and parentage, who, about two years ago, had an acute attack of inflammation, the exact nature of which could not be ascertained. He had never recovered his health, but had, from time to time, at intervals of from one to three months, had a sudden and profuse discharge of pus from the bronchi. There had also been several severe hæmoptyses. There were apyrexial intervals, during which the cough diminished, the appetite improved, and the febrile movement disappeared; but the discharges of pus were always preceded by an accession of fever, with increased cough, dyspnœa, and a feeling of constriction of the chest, which grew worse and worse until the evacuation occurred, when the symptoms would be quickly ameliorated and gradually disappear. The physical signs were as follows: Right side somewhat flattened, with decrease of its mobility. Right shoulder depressed, with the corresponding lateral curvature of the spine. Percussion resonance somewhat dampened throughout, but very dull in the axillary region, flat below the fifth rib in the axillary line, and very dull below the middle of the scapula. The auscultatory signs indicated a catarrh of the medium and smaller tubes on the right side; there were small and scant mucous râles from base to apex on prolonged expiration; in the lower axillary and subscapular regions the respiratory sounds were very feeble and distant. There was no indication of disease on the left side. It was suspected that there had been a pleurisy with subsequent chronic interstitial pneumonia, and that an empyemic cavity had formed a fistulous communication with the air-passages. The patient was admitted to St. Mary's Hospital, and an attempt made, by aspiration, to locate the pus-cavity, with a view to opening and draining it, should it be accessible. Four punctures were made with the aspirating needle, but the cavity could not be found, and it was concluded that it was an abscess-cavity in the lung, and too deep-seated to be reached. No unpleasant symptoms whatever, except a little soreness in the side, followed the exploration. The patient was up and about and eating heartily the next day. As the case was not amenable to surgical treatment, it was thought well to try the pneumatic cabinet. Under its use he improved considerably. The dyspnœa and cough decreased, and the general health of the patient was better. On his last visit, he appeared to Dr. Platt, who administered the treatment, to be

decidedly better, and expressed himself as feeling greatly encouraged. This was in the forenoon. Late the same evening he had a copious hæmoptysis. The following day there was another. On the third day there was no hæmorrhage. On the fourth day, in the afternoon, he felt so well that he went out to a neighboring restaurant and ate a beefsteak. On his return home he had another copious hæmoptysis, and was found dead in his room shortly afterward.

The autopsy was made by the speaker, with the assistance of Dr. David E. Callaghan, through whose courtesy he obtained the case. The right lung was universally adherent. The lower lobe was shrunken and affected with a catarrh of the finer bronchi, with some interstitial thickening. In its upper and posterior portion, lying near the vertebral bodies, under the protection of the transverse processes and an inch below the surface, was a cavity of about the size of a hen's egg, with irregular walls, lined by a new membrane and filled with blood-clots. It communicated with a neighboring bronchus. The pulmonary tissue in the vicinity was traversed by bands of fibroid tissue, and there were numerous tubular dilatations of the bronchi. The bronchial walls were thickened. The middle and upper lobes were congested and showed some chronic bronchial catarrh, with increased connective tissue. The left lung presented no abnormality beyond a slight degree of vesicular emphysema of its anterior and upper parts. The heart and all the other viscera were normal, or nearly so. There was no evidence of the present or former existence of empyema.

The President said that the principal points of interest in the case were in relation to the pneumatic treatment. Had the cabinet treatment any causal relation to the hæmoptysis? It was well known that chronic interstitial pneumonia was a disease during the course of which hæmoptysis very frequently occurred, and, as it had already occurred several times in this case, and as the last did not take place until about ten hours after the sitting, it could hardly be regarded as in any way due to it. The seat of the hæmorrhage was the old abscess-cavity, and the bleeding probably resulted from the rupture of some vessel which had undergone aneurysmal dilatation. The case was also of interest from a diagnostic view, and illustrated the utility and innocuousness of the aspirator as an aid to the diagnosis of obscure cases.

Gunshot Wound of the Abdomen.—Dr. F. W. Rockwell presented a specimen of gunshot wound of the intestines with the following history: A German woman, about forty-five years of age, while attempting to get a loaded revolver away from her husband, who was intoxicated, received a wound from the accidental discharge of the weapon. An hour afterward she was received into St. Mary's Hospital in a state of collapse, from which she never rallied. Stimulants, etc., were administered with the hope of getting her into a condition which would admit of an explorative laparotomy and treatment of wounded viscera, but within eighteen hours she died with all the symptoms of septic peritoni-

tis, having at no time been in a condition which would warrant any attempt to relieve her by operative measures. The autopsy, which was made by Dr. Leuf, the pathologist of the hospital, showed the following conditions: Rigor mortis well marked, and body well nourished. An opening nearly 1 ctm. in diameter was found to the left of the umbilicus (about 8 ctm.). It was blackened at the edges, and was the entrance of a canal which led downward and obliquely backward, through the fascia and outer margin of the rectus abdominis muscle, and pierced the peritonæum midway between the umbilicus and the pubes. From this point the ball had entered the great omentum, the wound in which was surrounded by a dark clot 8 ctm. wide. Eight perforations were found in a coil of the ilieum adjacent to this point, within a space of 40 ctm. of its length, and about 1 metre above the ileo-cæcal valve. All the edges were everted, the mucous membrane protruding and apparently preventing extravasation of fœcal matters. Two similar openings were found in the transverse colon to the right of the umbilicus. Most of the openings were not more than 1 ctm. in diameter and circular, one opening only in the ileum and one in the colon being twice this size and irregular in outline probably being wounds of exit and due to the oblique manner in which the ball passed through them. The body of the pubic bone on the left side was fissured posteriorly, it was denuded of its periosteum, and at the lower end of the fissure the compact tissue was driven in to the cancellous. There was marked injection of the of the whole peritoneal surface, patchy in character, and marked effusion of coagulated blood and lymph, with flaky pus between the intestinal convolutions and adjacent viscera, the intestines being bound together by extensive but feeble adhesions. The ball, in reaching the pubic bone, had penetrated the peritonæum for a second time, through its vesical reflection, and had passed between the pubes and bladder to lodge in the bone, the pre-vesical space containing a large clot of blood. The intestinal contents, soft in character, were found extruded in a few places, but to a very limited degree. The stomach was dilated to an immense degree, but otherwise healthy. The pancreas was normal. The liver was very soft, fatty, and flexible. The kidneys were in a similar condition, and could be doubled over without straining the capsule, and, when divested of the latter, a similar experiment caused no rupture of the convex surface.

The heart was firmly contracted and healthy in appearance. The lungs were normal except for a few slight adhesions and senile emphysema. The uterus was bound down to the rectum by old and very firm adhesions. There was a hydrosalpinx of the left tube, about 4 ctm. long and 2 ctm. wide. The right ovary was imbedded in old adhesions.

The clinical interest of the case centered in the fact that in so few hours a general septic peritonitis should occur, and progress to a fatal termination with almost no pain, the woman having complained but little of any distress. It had been Dr. Rockwell's intention, had the patient rallied sufficiently, to attempt relief by laparotomy and, if necessary,

resection of a portion of the intestine. This, so far as the case under discussion was concerned, would have been preferable to the tedious process of suturing so many wounds within such a short distance of each other. The occurrence of adhesions at so early a stage in the history of the case, and under such unfavorable general conditions, would strengthen, in the speaker's mind, the advisability of early operative interference in proper cases, as not only would the operation be less likely to be complicated by recent inflammatory products, but the necessary irrigation and cleansing of the peritoneal surfaces from irritating matters would be the best preventive treatment for the spread of the inflammatory processes present or threatened.

Fatty Tumor.—Dr. J. M. HARCOURT presented a specimen and read the history of the case of the patient from whom it had been removed.

On the Relations of Locomotor Ataxia to General Paresis of the Insane.—Dr. E. C. SPITZKA made some remarks on this subject.

Meeting of January 14, 1886.

The President, Dr. B. F. WESTBROOK, in the Chair;

Dr. A. H. P. LEUF, Secretary.

A Case of Multiple Urethral Stricture; False Passage and Prevesical Abscess.—Dr. G. W. WACKERHAGEN read the following history of the case of Mr. R., aged forty-six, of Scottish descent, a wholesale dry-goods agent, having a family history exceptionally good for longevity and freedom from sickness. He stated that when twenty years of age he suffered from gonorrhœa which continued about three months, but was followed by no noticeable sequelæ. His health had generally been good up to last June, but he noticed, after great exertion or exposure to cold, that he suffered from pain in the lumbar region, and, at his wife's instigation, his urine was examined for sugar and albumin, but was reported normal. She, however, noticed that urination was prolonged and accompanied by straining. He kept constantly at work until periods of indisposition became rather frequent, during which he was very reticent concerning his true symptoms, and to his attending physician, Dr. S. J. Rooney, he denied ever having had any genito-urinary difficulty. In July last he gave up business and went to various health resorts for recuperation. These changes produced very slight improvement, and in the latter part of August much of the trouble was made manifest by the rupture of a perineal abscess. Even then he did not seek surgical aid, but lived along with varying strength, and suffering from the dribbling of urine from the resulting sinus, until about the middle of November.

Three months before this date he casually mentioned to Dr. Rooney that there was a slight swelling in the perineal region, but not until two months after did he permit any examination, and then for the first time was the true condition of affairs ascertained. About the middle of November Dr. Wackerhagen saw the patient in consultation. He was extremely prostrated, emaciated, and suffering from an almost continuous dribbling of purulent, ammoniacal urine, through a sinus opening one inch to the right of the median rhaphe and extending two inches to a point about half an inch anterior to the anus. There existed also phimosis, a contracted meatus, and three urethral strictures, located as follows: the first, one inch and a half, the second, two inches and a quarter, and the third, four inches and a quarter from the meatus, the last being one inch in length.

Objections arising to an operation through the perinæum, only internal urethrotomy and circumcision were decided upon, and performed on the 19th of November. After the operation, considerable of the purulent

urine passed through the natural channel, and the spasmodic pains from which he had suffered greatly were in a large measure relieved. The general condition for a time improved. Each day the bladder (which was found to be very much contracted) was carefully washed out, and on alternate days a No. 33 sound was passed. Four or five days after the operation the spasms returned more violently than before, and the urine was passed mostly through the sinus. The vesical douche also became almost intolerable, and failure of strength and spirits was becoming very rapid. On the 28th of November it was determined to open freely into the bladder along the course of the fistula. This was found to pass backward and inward to a point near the sphincter ani, where, being met by a second incomplete fistula from the same direction on the left side, the two continued by a common channel upward and backward, penetrating the membranous urethra. The sinuses were now laid open, the main one was followed upward into the membranous urethra just in front of the prostate, and a free opening to the bladder was gained by cutting through the middle lobe. The hæmorrhage was very slight until the incision was made through the prostate; this was readily controlled by the antiseptic tent packing. The shock of the operation was considerable, though less than had been anticipated, reaction being promptly established by the free use of stimulants and heat. For three days all went well; milk-punch and other nourishment were retained, the temperature remained normal, the pulse improved in quality, and hope was re-established. Bisulphate of quinine, gr. v, and tincture of chloride of iron, gtt. xx, were administered every four hours, and one-half-grain suppositories of morphine were given as occasion required. Irrigation of the bladder was performed every six hours with flaxseed tea (carbolized) and boric-acid solutions. On the fourth day, however, the spasms returned as severe as ever, and could be controlled only by hypodermic injections of morphine.

On the fifth day there was slight wandering delirium, but no new developments, and that seemed to be referable to the medication rendered necessary by other symptoms. From this time he steadily failed, and on the 6th of December, the eighth day after the operation, death came from exhaustion.

The autopsy was made by Dr. Wales L. Cary, of Brooklyn. Consent to examine the body was not obtained until after it had been embalmed, and this interfered to some extent with the visual appearances.

Nothing in the external appearances was remarkable except the extreme emaciation, the firm *rigor mortis*, and the wound of operation. The latter appeared as an irregular V-shaped incision along the course of the two fistulæ, approaching within half an inch of the anus and extending forward about one inch and a half. On opening the abdomen, the viscera presented a normal appearance, except that the liver projected an inch lower than it should.

The cavity was filled with dark-brown watery fluid, but, the peri-

tonæum not deviating from its normal color and texture, this was considered a product of the embalmer's work.

A time limit permitted only a hasty examination, but the viscera appeared normal, except the kidneys, which, with the rest of the genito-urinary apparatus, were removed for subsequent examination by Dr. Leuf. The lower part of the descending colon and sigmoid flexure was firmly contracted to the size of a No. 30 sound throughout their greater extent, but just at the point where it passed into the true pelvis was a dilatation, nearly spherical, one inch and a half in diameter, filled with clear serous fluid.

The specimen shown consisted of the genito-urinary apparatus. It was examined by Dr. Leuf, from whose report the following description was derived: The penis, slit up along the dorsum, and viewed from above, presented the corpora cavernosa on each side, and the urethral mucous membrane between. This was wrinkled longitudinally in some places, and was narrower in some parts than in others. A short distance from the meatus such a narrowing was to be seen. There was a rent in the urethral wall commencing at a point 4 inches from the meatus and nearly ¼ inch in diameter. The laceration of the mucous membrane about the opening began 3⅝ inches from the meatus and extended backward one inch. The false passage must have been made just anterior to or at the bulb. Situated between the urethral laceration in front and the prostate behind was an abscess-cavity 2¼ inches wide and 2 inches long, containing a dark, ragged slough. Behind the abscess was the incised prostate with its cut edges separated, and measuring 1 inch in length. The bladder was of about the same size as the abscess-cavity, being 2¼ inches wide and 1½ inch long. Its walls were thickened. The vesiculæ seminales were enlarged and indurated. Both ureters were a little dilated, especially in places. The mucous membrane of the left ureter was inflamed, and contained a yellowish granular detritus and pus as high up as the renal pelvis. The right kidney appeared to be normal. The left contained in its upper half three confluent abscess-cavities, which had an average diameter of 1 inch. It appeared that the false passage extended from the urethral opening downward and backward, and to the patient's right until near the prostate, where it stopped. The abscess had in all probability formed at the terminus of this canal, then extended in all directions, and eventually opened into the urethra near the prostate.

Dr. Rockwell asked if the first operation was a deep urethrotomy or a divulsion.

Dr. Wackerhagen replied that it was a urethrotomy.

The following paper was then read:

ACUTE SUPPURATIVE INFLAMMATION OF THE MIDDLE EAR; SEPTIC MENINGITIS; PYÆMIA; MARKED PYREXIA; DEATH IN EIGHT DAYS.

By CHARLES N. DIXON JONES, M. D.,
BROOKLYN.

Inflammation of the middle ear is a much more serious affair than is generally supposed. This is due, in a great measure, to its anatomical surroundings, and to the fact that the morbid process occurs in a cavity almost completely closed in by osseous walls.

While it is true that acute catarrhal and acute suppurative inflammations of the middle ear are usually controlled by judicious treatment, and, even if allowed to run their course unchecked, in the majority of cases do so without serious detriment to the patient, and end in complete recovery, there are, however, exceptions to this general rule. The cases are by no means few in which the disease ends in producing more or less serious damage to the organ of hearing—a chronic otorrhœa, or even a fatal disease of the adjacent organs. I have recently attended a case in which pyæmia and meningitis rapidly followed the appearance of the aural symptoms, and death occurred in eight days. I believe that fatal meningitis is not rarely a result of unrecognized inflammation of the middle ear, and that its origin in this way is more common than is generally believed. As Delafield well says, acute meningitis is not very often directly idiopathic, but it is very frequently a result of suppurative inflammation of the middle ear.

The history of the case is as follows:

Mrs. K., aged thirty-three, sent for me November 5th, on account of a naso-pharyngitis. I found her a well-developed woman, in a fair state of general health, attending to her household duties, but complaining of a sore throat and headache. She stated that she had been well up to about one month ago. At that time several furuncles appeared on different parts of her body. She had been much debilitated from overwork for several weeks past. About November 1st she had assisted in nursing a woman sick with puerperal septicæmia, had sat up with her all night, and helped in preparing the body for burial.

At my first examination the following condition was found: Pharynx red and inflamed; left tonsil slightly swollen; body temperature, taken in the mouth, 101° F.; pulse 100. I prescribed a preparation of tincture of iron containing $\frac{1}{24}$ of a grain of the bichloride of mercury in each dose; also an astringent gargle for the throat.

November 6th.—Patient for the first time complained of her ear. She said there was a sharp pain, with a sensation of fullness and ringing in the left ear. The auditory canal was swollen; the membrana tympani was red and congested, but its whole surface could not be seen on account of the swelling of the canal. The meatus was scarified at one point. The hot douche and fomentations ordered; a laxative was given, and an enema ordered.

7th.—I found the patient decidedly worse. Soreness of throat and headache had increased. My order in regard to the douche and hot applications had not been carried out. The order was renewed with increased emphasis.

8th.—On my visit to the patient I found her much easier. I was prepared to incise the membrana tympani if the symptoms should indicate such a procedure, but I found that nature had preceded me. The patient reported that the pain in the ear had been very severe until about midnight, when she experienced marked relief; at the same time a profuse discharge came from the ear. On examination, after freeing the canal from the discharge, I was able to discover a central perforation in the drum-membrane. The patient remarked that the ear gave her no pain, but that there was a dull headache on the left side. The skin over the mastoid region was extremely sensitive and somewhat swollen. I ordered the application of several leeches, after which she was much easier.

In the evening the husband came for me in great haste, and stated that his wife had had a severe chill in the afternoon and that she was now delirious. I told him that I feared the brain had become involved, and promised to see her as soon as possible. When I saw the patient at 10 P. M. I found that my worst fears were realized. She was restless and excited, rolling from side to side in bed, countenance anxious, pupils dilated, surface of body dry and hot; pulse 142, temperature 106·8° F. in the vagina. At my request, Dr. McCorkle and Dr. Ernest Palmer were sent for in consultation. Dr. McCorkle not being found, Dr. Palmer saw the case with me at 10.30 P. M. We agreed in the diagnosis of acute purulent meningitis, and gave a very unfavorable prognosis to the friends. The following line of treatment was decided upon: Active purgation, with the bromide and iodide of sodium, dissolved in infusion of digitalis, and given in frequently repeated doses. I suggested the propriety of opening the antrum of the mastoid process. Dr. Palmer doubted the utility of any surgical procedure, and the friends from the first were decidedly opposed to any form of operative interference.

9th.—9.30 A. M., pulse 120, temperature 104·8° F.; voice hoarse, and speech somewhat inarticulate. Complains of numbness in right arm; in the arm there is partial paresis; there is also facial paralysis; stomach very irritable and will not retain the medicine. Purulent discharge from the ear; syringed out twice a day with warm water. Patient refers all her pain to the mastoid region; skin is tender and œdematous; Wilde's incision; bone smooth and not denuded of periosteum; bleeding encour-

aged. At 2.30 P. M., pulse 132, temperature 106·8° F. Gave fifteen grains of antipyrine with morphine hypodermically; in two hours gave twenty-five grains by rectum. Antipyrine produced copious diaphoresis; three hours' sleep, the first in twenty-four hours; pulse very rapid and feeble; temperature reduced one degree.

10th.—Patient restless and uncomfortable; has had several chills; complains of dimness of vision; pulse 148, temperature 107·7° F. At 10 A. M. Dr. Palmer saw her with me in consultation. The formation of pus was supposed by Dr. Palmer and myself to be indicated by the repeated chills, but there seemed no chance of getting at the abscess if one was forming. We therefore decided to administer fifteen grains of chloride of quinine by the rectum every four hours as an antipyretic. There continued to be a slight discharge from the meatus. At 10 P. M., patient anxious and excited; all her pain referred to the head; pulse rapid and thready, temperature 106·5° F.; articulation indistinct.

11th.—Very little change in the condition of patient; skin is dry and hot; patient restless and irritable; stomach will not retain any form of food or medicine; pulse 152, temperature 106·8° F. Quinine appears to have little or no effect on the temperature. Ordered thirty grains of antipyrine by the rectum, to be repeated in three hours. In the afternoon patient slept quietly for three hours. Evening, condition of patient apparently improved; she says she has no "pains or aches"; pulse 120, temperature 101·4°; voice is thick and indistinct; the discharge from the ear has diminished very much; paralysis of left leg; patient appeared cheerful and hopeful, although we had given her a gloomy prognosis several days before.

12th.—Pulse 120, temperature 105·5° F.; delirious at intervals; complains of a severe pain in right arm and left leg; can not bear to have the leg moved or touched; leg is swollen and œdematous; great tenderness along the course of the veins of left leg.

At 10 P. M., low muttering delirium; pupils moderately dilated and equal; imperfect attempts at articulation; picking at nose; subsultus tendinum; left leg swollen, pale, and paralyzed; extremities cold; pulse imperceptible at the wrist; knee joint swollen and tender.

The patient quietly died at 2 A. M. the following morning.

I deeply regret that an autopsy could not be obtained. The case is reported from a conviction that cases of the kind should be recorded, no matter how imperfect may be some of the details or how unfortunate the termination.

Fatal meningitis, as a sequence in cases of long-standing otorrhœa, is by no means rare; in fact, it is our duty to inform patients with a chronic discharge of the ear that there is always danger of such a possibility. But in the acute form of inflammation of the middle ear we do not, as a general rule, expect such a complication.

M. Dujardin-Beaumetz* believes that antipyrine acts on the cerebro-spinal axis, and lowers the temperature by modifying the nervous heat-centers. They both maintain that the effects of this agent vary with the disease. On the whole, I believe that the effects of the antipyrine in the case reported were good. It is true the apparent reduction of temperature was slight, but the patient was much more comfortable each time after its exhibition.

The question arises, Was the fact of the attendance of the patient in a case of puerperal septicæmia an ætiological factor in the disease? I have observed that nurses caring for persons sick with infectious puerperal disease are frequently made sick in various ways. In support of this, Dr. J. Chalmers,† of London, reports that four persons who were in close attendance in a case of puerperal septicæmia suffered from a form of blood-poisoning, one having an angry pustule, another erysipelas in the legs, the third severe and persistent skin irritation, and the fourth phthisis. My patient persistently denied that she had been exposed to cold in any manner.

Ovariotomy.—Dr. H. W. Skerry presented a tumor removed by Dr. F. W. Rockwell from a patient in St. John's Hospital, with a satisfactory result.

The following paper was then read:

DISEASES OF THE BRAIN

RESULTING FROM AFFECTIONS OF THE EAR AND THE TEMPORAL BONE.

By ARTHUR MATHEWSON, M.D., Brooklyn,

CHIEF OF THE DEPARTMENT OF DISEASES OF THE EYE AND EAR AT ST. MARY'S GENERAL HOSPITAL.

It is a perfectly obvious, but apparently often forgotten, fact that the brain and its membranes are most easily accessible to attacks of disease from without by way of the ear. The most cursory examination of the anatomy of that organ and its relation to surrounding parts will demonstrate this.

Taking, first, the external meatus, we see that its upper wall forms part of the floor of the middle fossa of the cranium, and the examination of a number of specimens will show that this plate of bone is often a very thin one, and, as noted by Gruber, Politzer, and Hyrtl, has gaps in it, so that the dura mater and the soft tissues lining the meatus come into immediate contact, and thus favor trans-

* "Phil. Med. Times," October 3, 1885. † "Brit. Gyn. Jour.," vol. i, 3.

mission of disease to the brain, or admit of its being easily injured from this direction, as in rude and unskillful attempts at removal of foreign bodies. The posterior wall of the meatus is also often thin, with congenital defects favoring the easy passage of disease from the meatus to the mastoid.

Going on to the middle ear, we find it in still closer anatomical relation to the brain—in fact, almost surrounded by it and the large vessels going to or from it. Above, it is separated from the cranial cavity by a wall often no thicker than a visiting-card, and sometimes having gaps, due, probably, to arrest of development. In front lies the carotid canal; below, the jugular fossa. The inner wall is perforated by the two fenestræ opening into the labyrinth, and offering a passage for disease to extend toward the brain, which it seems strange is not oftener followed. The Fallopian canal, through which passes the facial nerve running along the inner wall of the cavity of the tympanum, also furnishes a passage for disease inward, being also liable to gaps similar to those noted. Behind lies the opening into the mastoid cavities, lined by a membrane continuous with that of the tympanic cavity, and along which disease does very frequently pass. The mastoid cavities are in very close proximity to the cranial cavity, the roof and inner wall which separates them from the fossa of the lateral sinus being often very thin, and liable to the congenital defects which Hyrtl calls dehiscences, and supposes to be due to arrest of development.

From what has been said, it will be seen that the temporal bone appears to be more liable than any other of the cranial walls to these defects, which fact may help to account for the other fact noted by Schwartze—that diseases of the temporal bone are more liable to affect the brain than those of any other. The sometimes extensive pneumatic cavities connected more or less directly with the mastoid may also help to account for this tendency.

In the infant the inner walls of the mastoid cavities are thicker than in adult life when the cells have become larger, and mastoiditis is consequently more dangerous at the latter period than at the former.

The walls of both tympanic and mastoid cavities are everywhere penetrated by the foramina of the emissary vessels, especially the wall bounding the sigmoid fossa.

Besides the passages already noted from ear to brain is the fissure between the squamous and petrous portions of the temporal bone, through which, in new-born children, bands of connective

tissue extend from the dura mater to the cavity of the tympanum—a fact which accounts for the frequent occurrence of cerebral irritation in the otitis of young children. There are also others of these connective-tissue bands referred to by Gruber and Politzer, extending between the dura mater and the lining membrane of the aural cavities, which may serve to conduct disease from the latter to the former. The fact that the membrane lining the tympanic and mastoid cavities constitutes in its deeper layers the periosteum or nutritive membrane of the bone is important to remember, as showing how easily the nutrition of the latter may be affected, since caries of the bony walls of these cavities may be induced by suppurative inflammation of the former.

Such being the close anatomical relations between the cranial and aural cavities and walls, it is easy to see how disease, invading the latter, may pass on to the former. Disease, as we all know, is of very frequent occurrence in the ear, having two ways of access to it—viz., by way of the external meatus, and, still more frequently, through the Eustachian tube. By the last passage any simple cold in the head may pass on up to the tympanic cavity, and there set up a process ending, possibly, in permanent deafness or death. In scarlatina, diphtheria, and syphilitic disease of the throat and nose the ear is specially liable to be involved.

That the danger of disease of the aural cavities extending to the cranial is not merely a theoretical or imaginary one the experience of every otologist shows, and the periodical and standard literature of the subject is full of cases which demonstrate the frequency of its occurrence.

Statistics of cases of intra-cranial abscess show that a large percentage (twenty-five to fifty-three) of them originate in diseases of the ear and its annexa. There are several ways in which disease may proceed from the aural and mastoid cavities to the cranial. That which is most apt to attract attention, as presenting the most marked external symptoms, is an extension from the mastoid cells, when these parts have become involved in an inflammation of the middle ear. Connected directly by an open passage with the tympanic cavity, and lined, as we have seen, by the same membrane, inflammation affecting one may easily extend to the other, and experience shows that this often does occur. The mastoid cells once involved in a suppurative process, the passage to the middle ear may easily be closed by swelling, and soon the symptoms of accumulating and retained secretions begin to show themselves by pain, tenderness,

swelling of the external coverings, and, if relief be not given by artificial or natural openings, by signs of cerebral disturbance.

Mastoid complications may occur either in acute or chronic otitis media—more frequently the latter—and may be either the result of an acute exacerbation, or of irritation caused by the gradual accumulation of a cheesy or cholesteatomatous mass in the antrum or lesser cells, interfering by pressure with the nutrition of their bony walls and leading thus to caries, which may extend inward toward the brain and meninges, as well as outward. That it does not more frequently follow the former course is surprising, considering how much thinner the inner wall of the bone often is than the outer. In some crania the fossa of the lateral sinus is very deep, leaving the partition-wall between the mastoid and cranial cavities in this direction correspondingly thin and penetrable by carious processes. It is not always, however, that the brain or meninges are affected, even when the cranial walls have been broken down by caries, and there are cases where nearly all the temporal bone has been swept away without the meninges being seriously affected.

It is not necessary that any caries be present, or the bone walls be broken through, to produce intra-cranial disease, for a morbid process may be tramsmitted by way of the emissary vessels and the bands of connective tissue that have been referred to, and no trace of dead bone can be found in some cases on the most careful post-mortem examination.

Rare cases of mastoiditis, occurring, apparently, independent of tympanic disease, have been reported, and these may, of course, lead to intra-cranial disease like the more common forms.

It is a common supposition that, in cases in which there are cerebral complications of aural disease, nearly always there are marked symptoms on the side of the mastoid in the way of swelling and tenderness, etc., but this is very far from being the case, for there are many fatal cases in which no such symptoms appear. The mastoid is often not involved at all, and even where it is there may be no *external* evidences of it. In one of my cases, to be narrated, even very extensive necrosis of the extreme bony walls of the mastoid did not reveal itself by swelling of the soft parts covering it, or any other *visible* sign. The cases of intra-cranial disease from mastoiditis attract the most attention from their more obvious external symptoms, but in reality, according to my own experience, are not much more common than are those which are transmitted directly from the middle ear, especially by the way of the tegmen tympani.

That the cranial cavity should be invaded frequently from this direction is easily understood when we consider that inflammatory adhesions readily form between the membrana tympani and the projecting inner wall of the tympanum—the promontory—(which, even in the normal condition, are very near each other). As a consequence, the retained products of inflammation are pressed upward and find a perhaps not difficult outlet toward the brain. Where the membrana tympani is unusually thick and resistant, pus may as readily break through a gap in the upper bone wall as outward into the meatus; and we find cases where this has actually taken place, leaving the drum membrane intact. This fact of experience is a strong argument in favor of early paracentesis of the membrana tympani in those cases where there is evidence of the presence of retained secretion in the middle ear. The retained secretion may be purulent, cheesy, or cholesteatomatous.

Caries of the bone may or may not be present.

From such cases of inflammatory adhesions we may understand how the opinion, still widely prevalent among the laity, and to some extent in the profession, should still be adhered to that it is dangerous to check a discharge from the ear, it having been observed that in certain cases cessation of a discharge was followed by severe pain, and perhaps marked symptoms of cerebral disturbance, which have gone on to a fatal issue, while in others these symptoms were speedily relieved with the reappearance of the discharge.

The explanation of these cases is that the secretion was not checked, but dammed up by inflammatory adhesions or adhesions between the tympanum and inner wall, thus producing the symptoms of pressure, which were relieved again by the yielding of adhesions. The stopping of a discharge from the ear by bringing about a healthy state of the tissues is not harmful, and the experience of the most competent and experienced observers emphatically supports this view. The danger lies in just the opposite direction, that of neglect of careful treatment, for no one with foul-smelling discharges from the ear is safe from the danger of cerebral complications.

The disease may also extend by way of the labyrinth to the brain. Considering the two fenestræ (ovalis and rotunda) closed only by such delicate membranes offering so direct a way of access, it has always seemed to me a matter of surprise that this method of invasion is not more frequently followed. Even when the labyrinth is attacked by extensive caries, the meninges and brain may escape

being involved, and Pomeroy and others have reported cases in which the whole cochlea has been removed without cerebral complication.

The chief forms of brain disease that result from affections of the ear are suppurative meningitis and brain abscess. Meningitis may result from an invasion of disease from the tympanic or aural cavities in any of the ways before indicated. The inflammation may be very circumscribed, involving only the immediate vicinity of a small carious spot of bone, or it may extend over the whole covering of the brain and into the spinal canal. Inflammation of the pia mater may also result, and then we have leptomeningitis.

The symptoms of these cases of meningitis are, of course, often very marked, and, taken with the history, leave little doubt as to the diagnosis; but there are others in which the symptoms are so obscure as to render diagnosis difficult or impossible. In my own experience, I have found pain in the head, at first perhaps localized and not continuous, but, as the case went on, involving the whole head and becoming continuous, the most constant of all symptoms, and in a case of old suppurative ear trouble I have learned to base a pretty positive diagnosis upon it, even when there are not present vomiting, convulsions, paralyses, and other signs of cerebral disturbance, as they commonly are. I have seen cases in which, till near their fatal termination, pain in the head was almost the *only* symptom. If the ophthalmoscope reveals optic neuritis, this evidence is conclusive, though it is not always present. The duration of these cases varies from two or three days to several months. Their termination is nearly always fatal, though cases of recovery have been reported. They are most likely to occur in cases of chronic otitis, though they may occur in acute ones. It has been said that meningitis does not necessarily follow even the most extensive caries and necrosis of the temporal bone, and cases are reported in which nearly the whole of this bone has been swept away without fatal involvement of the meninges. Meningitis is frequently seen in combination with abscess.

Abscess of the brain may result from any suppurative inflammation of the ear (and, as before remarked, statistics show that about one third of all brain abscesses are of this origin), but most often they occur in chronic suppurations, few in acute otitis. There is usually caries of the bone, and a direct connection between the suppurative process in the ear and the intra-cranial, but cases are reported in which no direct connection can be traced, and it has been

supposed by Blitzer and others that bacteria were the means of transmission, a case of Moos's, in which a brain-abscess was found to contain great numbers of these organisms, being thought to support this theory.

Abscesses may occur in any part of the brain, but rather more frequently in the cerebellum. They may be separated from the diseased ear by a considerable thickness of sound brain-tissue, and have even been found on the opposite side without traceable connection.

Multiple abscesses may be found, and the size varies greatly, sometimes occupying nearly an entire lobe of the brain. They are sometimes lined with a dense fibrous capsule, and appear to be of long standing.

As in case of meningitis the symptoms of brain-abscess are often obscure, and as the two conditions frequently, of course, co-exist, a differential diagnosis is difficult. The most constant symptom here, too, is pain, apt to be referred to the corresponding side of the head or, in case of cerebellar abscess, to the occipital region. Toynbee has remarked an increase of sensitiveness on percussion over the suspected locality. Chills and intermitting fever, paralyses, convulsions, delirium, and nearly the whole range of cerebral and nervous disturbances would naturally be expected, and are often present, but may be almost entirely absent till near the end.

The duration and course of the disease are wholly irregular, and the post-mortem appearances and the history of the case sometimes combine to indicate that it began months before the fatal termination. The termination may be said to be always fatal, for the supposed cases of cerebral abscesses emptying themselves through the ear with recovery of the patient are not well authenticated. In such cases the pus was probably pent up somewhere outside the cranial cavity, causing by pressure symptoms of cerebral disturbance and perhaps meningitis, and were relieved when outlet was given.

Phlebitis of the sinuses in the vicinity is another intra-cranial complication that may originate in disease of the ear and mastoid, and, considering the anatomical relation of the parts, it is surprising that it is not more frequent. Politzer speaks of severe chills followed by high temperature as the most marked symptom when thrombosis of the sinus occurs. Metastasis is apt to follow, and exophthalmos, paralysis of ocular muscles, orbital abscess, and hard, painful swellings of the side of the head and neck are among the most common symptoms. Signs of cerebral disturbance are less marked. The

prognosis is, of course, very unfavorable, but cases of recovery have been reported.

Quite a number of cases have been reported of hæmorrhage from the ear due to erosion of the internal carotid by disease extending from the ear. Ligature of the common carotid has been tried in some of these cases, but without success.

Whether other than suppurative diseases of the ear may set up diseases of the brain, and whether other than strictly inflammatory and suppurative diseases of the brain are caused by ear affections, are questions that have been raised. There is little or no evidence as yet that would warrant an affirmative answer.

As to the question of treatment of these brain affections originating in disease of the ear there is little to be said, except that it is to be conducted on general principles. They are usually fatal in their termination, though now and then a case of meningitis is reported as cured. The uncertainty of precisely locating intra-cranial abscesses, and the fatal result almost sure to speedily follow explorative incision, with the small prospect of doing any good by emptying them, will prevent frequent recourse to this procedure.

Treatment in these cases must be rather preventive, and every case of suppurative otitis, even if it has continued for years without threatening symptoms, must be looked upon as treacherous and full of danger if neglected. Frequent and thorough cleansing and the constant use of disinfectant applications should be insisted upon, and polypoid granulations removed and kept down by appropriate means. Mastoid complications should be met by prompt and free incisions down to the bone, and by perforating its cells and removing purulent and cheesy accumulations and dead bone so far as it may be safely accomplished. I have found in a number of cases the application of sulphuric acid to the carious bone of service, this agent helping to melt the diseased bone away, while the sound tissue protects itself against it.

Brief reference to a few cases from my record-book will serve to illustrate some of the points in the foregoing.

A. P., a strong, healthy man of forty years, first seen by me January 17, 1878, had scarlatina when a child, which produced deafness of the right ear through suppurative otitis, though the discharge had long ceased and did not reappear till about 1875. There were pains at intervals over the temporal region for a long time, but none localized about the ear till about January 1, 1878, when he began to complain severely of pain in the ear and head. This went on with only temporary relief till January 25th,

when a Wilde's incision was made over the mastoid, and a free incision of the parts that could be reached through the external meatus. Up to this time the pain had been the chief, almost the only, symptom, as the temperature and pulse had not been much disturbed, and the functions of the brain were little if at all affected. The next day, symptoms of cerebral disturbance, delirium, etc., having supervened, trephining of the mastoid was resorted to, though there were no external signs of that part being affected, and none were found within. He became comatose and died next day, and the autopsy, made by Dr. Shaw, showed caries of the roof of the tympanum, inflammation of the drum over that point, and an abscess holding half an ounce of fœtid pus extending into the left lateral ventricle and lined by a thick membrane. From appearances, the abscess had been of long standing.

This case well illustrates the treacherous nature of these affections, and how slight symptoms extensive and fatal disease of the brain may produce till within a day or two of its termination.

M. K., girl of eleven years, when first seen by me, September 12, 1880, had a suppurative otitis media of the left ear, with polypi filling the meatus, an opening into the mastoid cells behind the ear surrounded with exuberant granulations, and facial paralysis of the corresponding side. With appropriate treatment all these symptoms disappeared by the middle of December. The drum-membrane healed, there was a considerable degree of hearing power, no trace of facial paralysis was left, and the opening in the mastoid closed. The result seemed unusually satisfactory, and remained so till February 10th following, when, after attending a child's party, she had signs of gastric and hepatic disturbance, such as she had suffered from sometimes previously to the ear trouble. There were occasional attacks of pain in the head, of vomiting, bleeding at the nose, constipation, tendency to drowsiness, but no marked sign of any cerebral disturbance, or any symptoms such as could not be well accounted for by the theory of hepatic and gastric derangement. The symptoms continued much the same till March 14th, when I saw her in consultation, and found no sign of any active ear or mastoid trouble. The ophthalmoscope revealed no optic neuritis, but a *slight* fullness and darkness of the *not* tortuous retinal veins, such as I have since noted in one or two similar cases, but the significance of which I did not then appreciate. Two days later she died, after a brief convulsion, having presented previously no further indications of cerebral complication than those already noted. The pulse had been generally slow and temperature normal. At the autopsy, made by Dr. Westbrook, the dura mater was found inflamed over the petrous portion of the temporal bone, and adherent at some points, with pus in some places between the dura and bone, and in the sheath of the fifth pair. There was an ounce or more of fœtid pus in the left cerebellum. There was no discernible lesion of the

mastoid or tympanic walls save that the upper surface of the roof of the tympanum was bare to a very slight extent.

This history is interesting as further showing the treacherous nature of these cases, and how long they may remain apparently dormant with no external visible sign of trouble while a fatal affection of the brain is in progress, showing few and obscure signs of its presence.

J. H. B., aged forty, policeman; a strong, ruddy-faced man; seen first in April, 1870, when he had a chronic suppurative otitis of four years' standing of the left side, with polypoid growths. These were removed, and the patient was not seen again till December 11, 1873, when he came complaining of dizziness, pain in left side of the head, and a "queer feeling" which had begun six weeks before. There was still a discharge from the ear, but no polypi or signs of mastoiditis. Free leeching gave relief, and he went on duty again, having no further trouble till April 1, 1874, when, after exposure to cold and wet, marked cerebral symptoms, paralysis of the ocular muscles, etc., came on, and he died five days later. No post-mortem examination could be obtained, but the symptoms pointed to brain-abscess, the seeds of which had probably been planted months before.

Mrs. McC., aged twenty-seven, otherwise healthy and of good constitution, came to me in November, 1876, complaining of pain in the left ear, which had been affected for several years with suppurative otitis. There were hard fibrous granulations occupying the inner end of the meatus. There were no indications of mastoid complications. In spite of constant and thorough treatment continued through the following winter, the pain continued with a very fœtid discharge. On the 18th of March, with the hope of giving possible relief to the wearing pain, a free incision was made over the mastoid, when, to the great surprise of myself and Dr. Roosa, and others who had seen the case and found no external sign of it, the bone was found to be extensively necrosed, with a large opening down into the cavity of the mastoid antrum. The general health had remained good, there was no cerebral disturbance of any kind, the pupil acted regularly, and the fundus oculi was normal. The opening in the mastoid increased till the dura mater and the pulsations of intra-cranial vessels could be plainly seen. Her sufferings became aggravated, terminating in death July 27th. The autopsy revealed a tumor of the size of a large hazel-nut projecting upward from the petrous portion of the temporal bone. The dura mater adjacent was dull and soaked in appearance, and partly detached from the bone. Much of the mastoid and petrous portions of the bone was gone. Microscopical examination showed the growth to be epitheliomatous.

It is remarkable that such extensive necrosis of the mastoid could take place without showing more external evidence of its presence.

C. F., a boy of five years and a half, seen in consultation with Dr. Hesse, March 21, 1878. Had been suffering with earache on the right side at intervals for two or three weeks before. The drum-membrane was injected, but not perforated. There were no external indications of mastoid trouble. The temperature was 102°, the pulse intermitting. The diagnosis of meningitis was made chiefly from the indication of pain in the head, which had lately come on. The child died on the 31st, and the autopsy revealed caries of the roof of the tympanum and extensive basilar meningitis.

C. E., a stout, healthy girl of ten years. Early in 1880 had pain followed by discharge from left ear, which had previously been well. Pain stopped soon, but discharge continued. About the 1st of March she had several convulsions, which passed away, leaving her as well as before, apparently, but on March 5th severe pain in the head came on, and continued till March 8th, when I saw her. There were the common appearances of a case of chronic suppurative otitis with polypoid granulations in the meatus, but no external indications of mastoid complication. Though turbulent and screaming with pain, she seemed in full possession of all her faculties. The diagnosis of intra-cranial complication was made, and an unfavorable prognosis given, chiefly from the indication of the character of the pain, which, from experience in similar cases, I had learned to rely upon with great confidence. The next day ptosis of the left upper eyelid was noticed, and other symptoms of progressing intra-cranial disease, probably meningitis. A difference of opinion as to the presence of intra-cranial disease with another gentleman who saw the case in consultation was settled by ophthalmoscopic examination, which showed well-marked optic neuritis on both sides. The patient died thirty-six hours later. Unfortunately, no autopsy could be obtained.

Dr. J. S. Prout remarked that, after what had been said, there was very little left to be told, except to repeat the caution about the possible seriousness of almost any apparently simple disease of the ear. The case of Dr. Merril, referred to that evening, had interested him. As Dr. Mathewson had said, the difficulty of diagnosis sometimes was very great. He had seen a case himself with Dr. Jacobi. The pupils were very active. The patient recovered. The diagnosis was extremely uncertain. Another case was that of a child which had convulsions and recovered. Still another was that of a man with unilateral headache and other symptoms that might be expected. The ophthalmoscope showed normal eyes. The tuning-fork was heard better with the bad than with the well ear. He recovered. In another acute case of lateral headache, mastoid-cell trouble was diagnosticated and Wilde's incision was made, but with a negative result. Finally, after a year, he recovered. In that case persistent pain over the side of the head seemed to yield to iodide and bromide of potassium.

Dr. L. C. Gray said that he had met with a number of such cases, and also with the same difficulty of diagnosis that Dr. Mathewson had spoken

of. He had noticed, though, that, where the ophthalmoscope gave no satisfaction, cerebral thermometry did. He referred to the cerebral thermometer that he had had so constructed that pressure upon the bulb would only cause a difference of not over $\frac{1}{4}$° F. No other instrument registered so accurately. This small difference was of no practical consequence, as there was always a difference of at least about two degrees in temperature, to positively indicate any pathological condition. In his opinion, distinct optic neuritis did not so often accompany these puzzling conditions.

Dr. Eccles said that, about three years before, he had seen a child, not quite three years old, who had had scarlatina, and who was then suffering from otorrhœa and symptoms of rheumatism of the joints. The child was apparently in great pain, and was partly unconscious. The scream peculiar to meningitis was produced by the child's turning in bed, and a diagnosis of meningitis and cervical rheumatism was made. Under the use of the salicylates all symptoms were relieved. He said that a superstition still existed that chronic suppuration should be left alone. He had noticed in his experience that even physicians quite often encouraged the idea. The question of the bacterial origin of the inflammatory affections of the ear and membranes mentioned that evening was still unsettled.

Dr. Leuf spoke of some of the anatomical variations of the temporal bone. A thin shell of bone normally bridged over the tympanum from the petrous to the squamous portion of the bone, and formed, at its junction with the base of the squamous portion, the fissura petro-squamosa. This fissure was almost always evident, even in the oldest skulls. It was sometimes not quite closed, and occasionally presented quite a large gap along its anterior half—*i. e.*, as far back as the hiatus Fallopii. This bridge, or shell, or skin of bone was the tegmen tympani. Some times a transverse fissure crossed the tegmen tympani. This fissuring would tend materially to aid in the extension of a middle-ear inflammation to the cerebral meninges. Senile atrophic changes frequently effected small perforations of the tegmen, and these might vary considerably in size from the finest to some as large as a millet-seed. They might be so numerous as to have a cribriform appearance, as in the specimens then exhibited. One of the skulls being passed around showed the perforations on one side only, which was a common occurrence. Both sides were seldom exactly alike. Occasionally the perforations coalesced and formed larger irregular openings. Perforations of the tegmen were commonest in old age, and especially in women, while fissuring and gaping of the fissura petro-squamosa were most often met in children. The perforations were most frequently found on that portion of the tegmen above and a little behind the malleo-incudal joint, and also farther back near the fissura petro-squamosa. Sometimes these perforations were extended by the atrophic process so as to communicate directly with the mastoid cells. It was very evident that the tendency to extension of middle-ear

disease toward the brain was increased in proportion as the bone was lacking, either because of unusual or defective congenital fissuring, or atrophic perforations.

The PRESIDENT related an interesting case of suppuration along the course of the veins. He had seen the patient with Dr. P. H. Kretzschmar. After two months he had signs of mental aberrationand a melancholic appearance. Acute miliary tuberculosis was diagnosticated. The autopsy verified the diagnosis, and also revealed an abscess extending from the diaphragm to the middle of the axilla. Previous to death abscesses had appeared under the scalp. It was noticed post mortem that wherever an abscess had appeared extra-cranially, another had formed exactly opposite inside the calvaria. There was also an acute suppuration of the middle ear of the right side. One curious fact was that the pus had gone up between the bony and the membranous portions of the Eustachian tube. This case was interesting because it showed the course of the pus along the veins in the bones.

Dr. GRAY said that cases of the dissection of pus along the tube had already been reported.

Dr. MATHEWSON remarked that there were many deaths from ear cases when the true causes were never suspected. He related a case that he had once seen with Dr. Hutchins. There was a history of a former discharge, but none of recent date. The retention of some of the pus had formed a thick plug, which set up all the subsequent trouble. It was removed, and the tympanum was found full of cheesy matter. This was dug out, and the patient got well.

Dr. W. F. GARDINER recalled a case he had seen at St. Mary's Hospital. Dr. Leuf made the post-mortem examination and found a chronic suppuration of the middle ear. This patient had suffered from depressed spirits, and was supposed to have alcoholic gastritis. He believed death was due to pneumonia. He asked Dr. Leuf if he recollected the case.

Dr. LEUF replied that he did; that the cause of death was pneumonitis, and that the tegmen tympani in that case was cribriform on both sides, and the dura mater partly inflamed opposite these openings on the affected side.

Meeting of January 28, 1886.

The President, Dr. B. F. WESTBROOK, in the Chair;

Dr. A. H. P. LEUF, Secretary.

A Case of Great Hypertrophy of the Heart from Valvular Disease.—Dr. GLENTWORTH R. BUTLER said that the case the history of which he presented had occurred in his service at St. Mary's Hospital:

A. G., aged twenty-nine years, a native of the United States, a waiter, was admitted to the hospital January 5, 1886. His family history was negative. He complained of gastric distress, swollen feet, and urgent dyspnœa. The dyspnœa began in the early part of September, 1885, and was coincident with his gastric symptoms. He had suffered frequently from acute rheumatism, the attacks dating from the ninth year of his age. He had recently spit blood on two occasions.

The physical signs on admission were as follows: Face cyanotic, pulse rapid, excessively irregular, and very small. The jugulars were distended and pulsating. The chest was deformed, the sternum at its lower part was thrown forward, and the ribs were depressed laterally. Over the entire præcordia and beyond its borders a heaving pulsation was plainly visible. The apex beat was felt two inches to the outside of and two inches and a half below the nipple. The præcordial area of dullness was greatly increased, extending from two inches to the left of the nipple across to the right of the sternum. Epigastric pulsation was marked. This region, as well as the hepatic, was painful on pressure, and the liver could be felt to pulsate on attentive examination. Auscultation revealed a tumultuous action of the heart. The only murmur to be distinguished at that time was a systolic bruit most intense over the tricuspid area, but also heard at the apex. There was also a suspicion of a diastolic murmur at the apex, but the diastole was too short to determine the fact.

Rest, turpentine stupes over the epigastrium, extract of *Cactus grandiflora* in ten-minim doses, iron, and a mineral acid improved his condition somewhat. On January 9th digitalis was substituted for the *Cactus grandiflora*, and dry cups were applied over the liver. On January 15th the heart was acting with much greater regularity and the pulse was materially changed, presenting the characters of aortic regurgitation. On auscultation, a to-and-fro murmur was distinctly made out over the aortic orifice, the diastolic portion being most intense at the apex. The systolic murmur over the tricuspid area had well nigh disappeared. The patient's symptoms improved somewhat during the next few days, but death occurred suddenly on the 22d of January, seventeen days after his admission.

The case was interesting from a diagnostic point of view. The result

of the first examination led to a probable diagnosis of mitral stenosis, with tricuspid regurgitation, although at no time during the progress of the case was there a presystolic murmur. The signs pointing toward this lesion were the smallness of the pulse, cyanosis, jugular and hepatic pulsation, with evident hypertrophy and distension of the right heart. When the cardiac muscle had partially regained its power the right heart emptied itself more completely, as evidenced by the lessened intensity of the murmur over the tricuspid area and the disappearance of cyanosis and concomitant symptoms. The left ventricle being better filled and contracting more strongly, the diastole too being longer, propelled its contents with sufficient force to develop the to-and-fro murmur of aortic stenosis and incompetence.

The autopsy was made on January 24th by Dr. A. H. P. Leuf. The pericardium was everywhere adherent, the pericardial cavity being nonexistent. The heart, including the adherent pericardium, weighed thirty-six ounces. Both sides of the heart were enormously distended with blood. The mitral orifice was stenosed, hardly admitting two fingers. The aortic orifice was stenosed and the valve incompetent. The cusps of the aortic valve were thickened and adherent for about one third of the extent of their edges. The posterior cusp especially was thickened, and was the main factor in the incompetency. The liver was of the nutmeg variety. There was an accessory spleen of the size of a pea, with a long pedicle.

A Case of Angina Pectoris.—Dr. Butler also read the following history of a case seen at St. Mary's Hospital:

F. C., a woman, thirty-five years of age, married, a native of Ireland, was admitted to St. Mary's, January 6, 1886. She had been in good health, with the exception of occasional attacks of facial neuralgia, until August, 1885, when she began to suffer with paroxysms of pain which were referred to the præcordial region. Slight and occasional at first, they became more frequent and severe, until at the time of her entrance into the hospital they were excited with a varying degree of acuteness by the ingestion of food, motion of any sort, or long-continued conversation. The pain was described as commencing at a point just to the left of the lower end of the sternum, extending through to the back, and down through the shoulder and arm of the corresponding side to the hand. A sense of numbness and pricking in the arm and hand accompanied the pain, which was described as lancinating. In her severest attacks, a fear of immediate death and a sensation of dyspnœa were experienced. Swelling of the feet and legs sometimes occurred. Her appetite was poor, her body was well nourished, and bowels and menstruation were normal in regularity. Physical examination revealed a somewhat slow pulse of high tension, so far as could be determined by the touch. The sphygmograph was not employed. The heart was apparently normal in size. The only auscultatory deviation from the normal was a decidedly accentuated aortic second sound. Fowler's solution and nux vomica with

rest in bed, and nitrite of amyl for the relief of the paroxysms of pain, constituted the treatment. The patient progressively improved under this regimen. The paroxysms were invariably cut short by the nitrite of amyl, and, subjectively, nothing unpleasant remained but a "fluttering" of the heart, until the morning of January 23d, when she had a paroxysm, which was relieved by the usual remedy. On the afternoon of this day another attack occurred, which proved promptly fatal. The autopsy was made on January 24th by Dr. A. H. P. Leuf. A large part of the ascending portion of the aorta was atheromatous. The anterior portion was much thickened at the base of the aortic cusps, the latter being also somewhat thickened with loss of normal curve and elasticity, but still competent. The coronary arteries were constricted and narrowed at their origin and emergence from the aorta, the anterior coronary especially. The papillary muscles of the left ventricle were affected with fibrous degeneration.

A Specimen of Pulmonary Tuberculosis, with History.—Dr. JOHN HORN said that the specimen which he presented was from a case of phthisis in which the symptoms during life were very well marked, and in which the pathological changes were extremely characteristic. The specimen was removed from the body of Peter H., twenty-four years of age, born in the United States, laborer, who came to St. Mary's Hospital, on December 5, 1885, complaining of a short hacking cough, which had existed for about a year and a half, and which had been on the increase for a few months previous to his admission into the hospital. He had had night-sweats, frequent chills and elevations of temperature; he had become emaciated and had lost his appetite. He gave no history of hæmoptysis or any suspected previous pulmonary trouble, and was not aware that he was suffering from phthisis. His sister died of phthisis; otherwise his family history could not be ascertained. Physical examination showed positive signs of phthisis. He received the necessary care and treatment and got along very well until January 19th, when he expressed himself as feeling too weak to leave his bed, and he died the next day, January 20th, having, during his stay at the hospital, been able to walk about the ward every day with very few exceptions. The *autopsy*, made by Dr. Leuf, revealed old pleuritic adhesions on both sides. The right lung contained a large cavity in its upper lobe. The middle lobe was solid with tubercles which were becoming yellow—some were already yellow. The lower lobe was carnified. The upper third of the upper lobe formed one single cavity; the rest consisted of smaller cavities and dilated bronchi. In squeezing a section of the right lung it was noticed that there exuded a thick, tenacious, muco-purulent material from the bronchi; the walls of the bronchi were thickened; the bronchial glands were swollen and caseous. A number of nodular masses were felt on palpation in the substance of the lung; they were the so-called tubercle masses which were made up of several tubercle follicles, these tubercle masses had between them lung tissue which was very much congested. The right lung showed the various stages of phthisis very well, the lower lobe being in the con-

dition described as acute phthisis, while the middle and upper lobes were in the more advanced stages. In examining the left lung it was found that the whole upper lobe was one large cavity; the lower lobe had undergone cheesy pneumonia, probably tubercular.

A Case of so-called Hermaphroditism.—Dr. A. H. P. Leuf exhibited the body of an eighteen-months-old child upon which he had made an autopsy at the Morgue for Coroner Menninger, who had suggested showing it to the society because of its supposed double sex. Dr. Leuf said he was particular to say so-called hermaphroditism, because he did not believe there was a true one except among the lowest order of animals. It was impossible to imagine by what freak of nature such a monstrosity could be developed. It was easy enough to account for double-headed, or double-bodied, or four-armed, or four-legged monsters, but not for a double sexual apparatus alone. What we knew of embryology was sufficient to set at rest any idea of the possibility of true hermaphroditism. All the cases so reported were those of pseudo-hermaphroditism, and owed their appearances to intercepted development or excessive growth of a part of the external genitalia. Every one of these cases admitted of a positive establishment of the true sex if a sufficiently thorough examination was permitted. In males it sometimes happened that the scrotum was fissured with or without a failure in the descent of the testicles. If, in connection with this, there was a hypospadias so marked as to place the urethral opening at the peno-scrotal junction and the penis was poorly developed, the appearance of the female genitalia was readily presented on superficial examination or inspection. Each section of the scrotum represented a labium majus, and the space between, the opening of the vulva. The extreme hypospadias would make the urethral orifice appear as though projecting forward from the vestibule, and the diminutive penis would take rank as an enlarged clitoris. Close inspection would easily settle the question in even so extreme a case. On the other hand, the female might be mistaken for a male if the hymen was imperforate with the labia wholly or partly united and the clitoris enlarged. Other modifications lent additional uncertainty to an accurate estimation of the true sex without thorough investigation. Examination, ever so carefully made, by an ignorant person, whether professional or not, was certain in many of these cases to lead to confusion and a report of another case of hermaphroditism. Certain pathological conditions of the external genitalia added still more to the difficulty in establishing the true sex without thorough investigation. He had seen a number of these persons, some of them positively believed to be double-sexed by even medical men, and yet the differentiation had been easy.

The following paper was then read:

MODERN ADULTERATIONS IN FOODS, AND THEIR RELATIONS TO DISEASE.

By E. H. BARTLEY, M. D.,

PROFESSOR OF CHEMISTRY AND TOXICOLOGY IN THE LONG ISLAND COLLEGE HOSPITAL, AND CHIEF CHEMIST OF THE BROOKLYN DEPARTMENT OF HEALTH.

The time was when God sent meat and the devil sent cooks; but I am constrained to believe that his Satanic majesty is no longer satisfied with the damage to be done by bad cooking, and has started a market.

The seeds of much mischief to our bodily health are undoubtedly contained in modern foods. Adulterations in food products are very common in these days, some of which are harmless and allowable, while some are positively dangerous. Until within a very few years there was so much sensationalism and unscientific statement about these matters that one could not afford to believe half that was told. Within the last ten, or even five, years a great change has taken place. Instead of leaving such investigations to the secular press, scientific men have been called to take up the work of investigation, and place our knowledge upon a scientific basis. Chemists have been liberally paid to devise new adulterations, and chemists have been employed to follow their track to correct the results. The whole realm of the science has been ransacked for means of cheapening and substituting foods on the one hand, and the skill of the analyst has been applied, on the other, to their detection and prevention when necessary.

This condition of affairs must continue as long as competition is a prominent element in trade. The popular sentiment, too, is undergoing a marked change in regard to substitutes for old forms of foods. It is, with a great many intelligent persons, no longer regarded as a crime to sell lard as butter, stained and polished coffee for what it is not, corn flour for wheat flour, water for milk, or goat meat for mutton. These are regarded as merely tricks of trade. The word *adulteration* is too harsh a term to their ears, and they prefer to call them *substitutes.*

As physicians, we are only concerned with injurious adulterations. Of the great variety of adulterants in use, but a small number are to be regarded as injurious, most of them being only fraudulent. We do not, of course, advocate the practice of fraud in a matter so vital as our daily bread; but we must leave that part of the subject to the

boards of trade and the general public. But, when these adulterations can be shown to have an injurious effect upon the health of any who are likely to partake of them, we are bound to speak with no uncertain sound. Nor should we be content to leave this to the health officials entirely, but it should be a part of the duty of every physician to impart to these authorities any information that will assist them in detecting and prosecuting deleterious frauds of this kind. In considering the subject of injurious adulterations, we should be governed by the following rules:

1. The public health is made up of the health of individuals, some of whom are in good physical condition, while others are the victims of various disorders. The invalids of the community are our especial care, and must be as carefully protected from injury as the most robust.

2. Any adulteration which can work harm to any class of persons in a community should not be permitted to be sold as food in that community. That is, by way of explanation, provided that the food so adulterated is, when in the natural unadulterated state, a fit food for such class of persons. Thus corned-beef and cabbage might work harm to young children, and yet be a fit food for healthy adults, who are most likely to eat of it. If the same article is preserved with boric acid, it may work harm to a certain class of persons who think themselves healthy. Such an adulteration should be prohibited.

3. A substance may be a useful medicament in certain pathological conditions for a limited time, and yet, when taken for a long time, may prove very injurious. The very fact that a substance has a decided physiological action renders it unfit for a food to be used for an indefinite period. The continued stimulation of any organ or function sooner or later leads to diseased action. A food must, therefore, have no specific physiological action upon any one organ, or set of organs, especially if it is a staple article, often eaten.

4. A substance which is foreign to the human body, and can not be burned up or transformed into a substance which is natural to the body, is to be regarded with suspicion until it is shown that it is without any appreciable action upon the digestive or excretory organs. The kidneys and liver are the chief excretory organs. These organs will not long endure overwork without becoming diseased. It is a recognized fact that congestion and inflammation of both these organs are due in many cases to overwork and irritation

from foreign bodies; in short, from unnatural stimulation. Dickinson, speaking of the causes of nephritis, says:

The blood is charged with material excessive in quantity, or unnatural in quality, which these glands take upon themselves to remove. Their own proper elements of secretion are poured upon them in sudden and excessive amount, or matter is thrown upon them which is foreign to their usual habit. As a consequence of overwork, or of work to which they are not adapted, they take on a turbulent and abnormal activity. They become congested, the tubes get choked up with epithelial growths, and the disease is established.

Among the causes of nephritis we must include certain substances taken into the body, which act as renal irritants—such as turpentine, alcohol, mercury, lead, arsenic, phosphorus, boric acid, potassium chlorate, cantharides, carbolic acid, and some other aromatic bodies which are not oxidized in the body. Among these substances the one especially deserving of mention is alcohol, not because it is the most irritant, but because, from its very wide-spread use, it is more frequently applied than any other. I think it is well understood that alcoholic beverages cause certain well-marked degenerations when taken in considerable quantities for a long time.

The most frequent changes are fatty infiltration of the liver, gastric catarrh, or chronic gastritis with mammillation of the stomach and occasionally fibroid thickening of the walls, cirrhosis of the liver, and induration of the kidneys.

The effects seem to vary somewhat with the character of the beverage used. For example, in Vienna, among beer drinkers, it is said that fatty changes are more frequent than in northern European countries, where spirits are more commonly used. There is a prevailing opinion, based upon good, though not conclusive, evidence, that the modern artificial beverages are more disastrous than the natural products of a generation ago. It is admitted by beer drinkers that one can not endure the American beers so well as the best imported brands. The difference in the effects of pure apple whisky and those of the modern article known as whisky is not in the alcohol they contain. Alcohol has the same effect wherever found; but it is the adventitious substances that make one pleasant and the other disagreeable, that make the one a simple stimulant and the other a poisonous potion. So much sensationalism and uncurbed imagination has been let loose upon this subject that we are sometimes at a loss to sift out the few grains of wheat from this chaff. It can be stated with safety that artifi-

cially prepared alcoholic beverages are very common among both the native and imported brands.

In some cases nothing can be said against these artificial drinks on sanitary grounds, for they are made from alcohol very carefully deprived of its fusel-oil, and from even the peculiar flavor which would reveal its origin. This is a necessity, as otherwise connoisseurs would be able to detect the fraud. Alcohol is sometimes added to weak wines to *fortify* them. A recent reliable authority upon the subject enumerates eighteen different coloring agents and twenty-five flavoring agents, besides five mineral substances used by wine manufacturers to prepare wines for the market. This book is written for the trade and not for the public, so that we are justified in taking the directions as tolerably reliable.

The same authority says: "Pure French brandy is indeed an article unattainable by the small consumer." * He says: "An excess of burnt sugar is introduced into the spirit, followed by sundry portions of cayenne pepper, grains of paradise, horse-radish, acetic ether, etc." † It would be impossible to follow out the details of this subject. It has been determined by Dujardin-Beaumetz that the toxic action of alcohol is greatly increased by impurities; so that an inferior brandy has a lethal action nearly one half greater than the best ethylic alcohol. The experiments of B. W. Richardson, Eulenburg, Rabuteau, and Furst agree in assigning very poisonous qualities to fusel oil as an adulterant of alcoholic drinks. As to the action of the various ethers of amylic alcohol (fusel-oil) so generally used in the manufacture of artificial drinks, we have but few data; but it is stated on good authority that their action is injurious. We should not think of recommending amyl nitrite (one of these ethers) as a drink, even in very minute quantities.

What shall we say of turpentine, alum, copper sulphate, lead acetate, and tannic acid, occasionally met with, or the large number of coloring agents in every-day use in coloring wines, and the long list of other agents used? Sickness, in the form of vomiting, has frequently come to my notice from partaking of artificially flavored drinks, undoubtedly due to the ethers used.

How much of the injury to dram drinkers is done by these added substances it is impossible to say. We are all familiar with the fact that those who indulge in cheaper and more adulterated drinks of this class suffer more than those who drink only such as are known to be pure.

* "The Brewer and Distiller," p. 166. † *Loc. cit.*

Lager beer has become almost a national beverage. Some of the breweries are sending out from 800 to 1,000 kegs of beer a day, and this is no exceptional city in this respect. There are manufactured and sold in this city each year, exclusive of what is brought in from other places, about 1,350,000 barrels, or over 41,800,000 gallons, of ale and beer. This quantity is distributed among 700,000 people, at the rate of 60 gallons *per capita* per annum. The importance of keeping this beverage pure and wholesome, and free from injurious adulterations of any kind, is self-evident.

Recent investigations, conducted by myself to determine the character of the beer manufactured and sold in this city, have shown that, although many of the extravagant statements of sensationalists are not borne out, there have grown up in recent years certain practices which must be regarded as harmful to the health of beer drinkers.

A perfectly pure solution of extract of malt, dextrin, maltose, and extractive matters, containing a small percentage of alcohol, can not be regarded as injurious to health when taken in reasonable quantities. When, however, this liquid is allowed to contain a constant though small quantity of copper, zinc, and in some cases lead, as proved by my investigations, and when there are numbers of men and women who drink from twenty to one hundred glasses a day, even these small quantities of these metals become matters of great importance, especially to those persons whose kidneys are defective from disease or overloaded with effete materials. Suppose a pair of kidneys and a liver have to pass through them but two or three grains of copper and zinc daily, except on special occasions. We must remember that these metals, while not very poisonous, are abnormal substances to the habit of the kidneys, and somewhat irritating; that this action, though slight for a single day, is kept up for a number of days—yea, for the years of a life-time. How much of the gastric catarrh and renal and hepatic troubles seen in beer drinkers may be due to these contaminations? The probabilities are too strong to allow us to pass them by with unconcern. This is not all. Competition has compelled brewers to turn out very large quantities of beer in order to make it pay to do business on the small margins allowed. This, again, necessitates either an enormous storing capacity and great outlay of capital, or some means of shortening the time of manufacture.

An examination into this subject revealed the fact that in one of the very popular breweries, sending out about six hundred kegs

daily in hot weather, the total storing capacity would only allow of a storage of twenty-nine days when every cask was kept full, which is seldom the case. The object of keeping the lager in the resting-vats for three to four or even six months, as was formerly done, and is still done in Bavaria, is to allow the beer to clear itself of yeast, etc., by settling.

In order to get the beer out in as short a time as two or even three weeks after the completion of the fermentation, it is necessary to use clearing agents. The substances used very generally for this purpose are isinglass, Iceland moss, gelatin, tannin, cream of tartar, etc. Gelatin or isinglass seems to be the most commonly used. A solution is made in water with the assistance of cream of tartar or tartaric acid. This is poured into the casks and stirred. The tannic acid of the hops unites with the gelatin and carries down the floating particles of yeast and other causes of turbidity. Sometimes the beer is first treated with tannin, and then gelatin in larger quantity, so as to clear it very quickly.

The addition of the cream of tartar or tartaric acid renders the beer strongly acid. This makes it necessary to add bicarbonate of sodium, to neutralize the acid and remove the sharp taste. This is done at the time the beer is put into the keg, just before sending it out. Another object of this bicarbonate of sodium is to give the beer a bead. Another cause of acidity is in certain acid fermentations which frequently take place after the alcoholic fermentation. This may be due to lack of cleanliness in the brewery or to the want of a sufficiently low temperature in the storing cellars to keep the beer. The addition of gelatin makes the fluid especially subject to these foreign fermentations, such as the lactic, butyric, and mucic fermentations, which occasionally give the brewers much trouble and require the addition of certain antiseptics. The anti-fermentatives found in breweries visited were principally salicylic acid and calcium bisulphite. These foreign fermentations, when well established in a brewery, require the services of the "beer doctor" to eradicate them. He is a recognized necessity, who, by the use of various antiseptics and flavoring substances, "doctors" up a spoiled brew and makes salable what would otherwise have to be thrown away.

These antiseptics are not added in sufficient quantity to kill the ferment, but are only inhibitory. These ferments, when taken into the stomach, have been shown by Pettenkofer to produce gastric and intestinal disturbances, sometimes of a very severe character. The action is akin to that of slightly soured milk. This same fault is

occasionally met with in beer containing floating yeast, which the imperfect clearing process has not removed.

All foreign authorities agree that beers which have developed these foreign fermentations, as well as those containing floating yeast, are injurious to the health of those consuming them, and consequently in some parts of Germany it is forbidden to sell them. The use of antiseptics and disguises to make such beer salable is a punishable offense. To control this matter, in Bavaria at least, governmental inspectors are maintained, and the breweries as well as the beer of the markets are kept under supervision. Such inspection is needed in this country at the present time. The presence of the butyric and putrefactive ferments in a brewery are manifested by a peculiar odor to be detected by an expert on going into the cellars. In one brewery visited by me last summer I detected this odor on entering the cellar. In this same brewery very large quantities of bicarbonate of sodium were being added to the beer—at least two ounces to the keg containing one hundred glasses, or about 9·5 grains to the glass. In other breweries the quantity used varied from half an ounce to an ounce and three fourths to the keg by actual weight.

It will be seen that a man who habitually drinks twenty glasses of beer daily—not an unusual allowance for some drinkers—would take one hundred and ninety grains of the bicarbonate. It must be remembered, however, that a large portion of the bicarbonate is decomposed before being taken into the stomach; but in eight samples, from as many different breweries, an excess of the bicarbonate was found in each sample. It was observed that men drinking freely of lager beer thus treated habitually passed alkaline, turbid urine. In regard to the use of the alkaline salts Brunton says: "The excessive use of alkalies or their carbonates is injurious, and their employment to reduce obesity may, unless carefully watched, be followed by serious consequences." That the excessive use of alkaline carbonates may derange the digestive organs is well known.

The effect of these large doses of salts of sodium, when continued for a long time, may possibly be injurious to the kidneys, if for no other reason, because of the necessity of their eliminating large quantities of the alkaline carbonate. The stomach refuses food, and the health is consequently impaired by this excessive amount of alkalies. Add to this the disturbing action of imperfectly finished and clarified beers, and a small amount of injurious metals, and we may ask ourselves why modern beer ever agrees with any one.

I must not leave this subject without remarking that some brewers in Brooklyn and New York prepare a beverage that is comparatively free from these objections. Bottled beers are, as a rule, better than those sold over the counter, and are not treated with sodium bicarbonate. The facts here stated show the necessity of a frequent inspection and constant sanitary control of modern breweries as the only way of regulating the quality of lager beer.

Among injurious adulterations of food we may mention the addition of red lead, chromate of lead, arsenite of copper, Martin's yellow, vermilion, arsenical fuchsin, and "fusel-oil" to confectionery, nearly all of which practices have been detected in this city. The coloring of vermicelli and pastry with chromate of lead is equally reprehensible. At least one case of lead poisoning in New York was traced to this cause.

The practice of coloring pickles, peas, etc., with copper received a severe blow last June by the death of a girl of seven years, from a pickle colored with sulphate of copper, two days after the Department of Health of this city had prohibited the sale of "greened" pickles.

The sale of head-cheese and Bologna sausage made from stale, unsalable meat, treated with borax and saltpetre and then colored with Venetian red or fuchsin (aniline red), furnishes another example of the fertility of "Yankee ingenuity" in furnishing food for the human race.

Scarcely less interesting is the practice, recently discovered, of polishing and coloring inferior grades of coffee to make them resemble the more desirable brands. The colors used for this purpose are nearly all the ordinary cheap pigments, such as ochre, umber, Venetian red, animal black, Prussian blue, indigo, French chalk (soapstone), chrome yellow, one sample of which was loaded with arsenic, arsenite of copper, etc. These and similar metallic and poisonous adulterations need no discussion or comment to fix their place in relation to the question of health.

The only question worthy of even a passing consideration is that of the quantity of these various ingredients used. It sometimes happens that physicians are unguarded enough to admit that, because the quantity used is less than a medicinal dose of copper, lead, tin, zinc, arsenic, or chromium, as the case may be, it can not be harmful. In the case of lead or mercury, which are cumulative poisons, it would be admitted that more than mere traces would be dangerous in the course of time. In the case of arsenic, renal in-

flammation has been induced by living in a room whose walls were covered with a paper colored with arsenite of copper. In other instances obstinate conjunctivitis, bronchitis, and even diarrhœa leading to fatal results have occurred from arsenic obtained from the same source. In the case of copper, tin, zinc, and other metals, less is known definitely. It is certain, however, that large doses of these metals are irritants to delicate tissues, and no one of us would like to prescribe one-grain doses of any one of them to be taken for a life-time. Yet in the greening of preserved vegetables larger doses of copper than this are provided. In some canned tomatoes examined in the laboratory of the Brooklyn Health Department last year, over three grains of tin were found in each two-pound can. The fact that these metals are abnormal to our food, that they have irritant properties upon the kidneys, and that there are many cases of latent nephritis in every community which may be injured by even slight irritants, are sufficient causes to prohibit even very small doses of these metals in articles of every-day consumption.

As before stated, any substance which has a distinct physiological action which makes it of value as a medicine must necessarily make it dangerous as a food to be used indefinitely, for long-continued stimulation of any organ or set of organs will sooner or later derange the functions of the organ or organs.

In this connection we may refer to another subject which has not received the attention from the profession that it deserves. I refer to the use of preservatives. Most of the new preservatives in the market depend for their preservative action upon boric or salicylic acid, either free or in combination. Both of these acids are capable of decidedly irritative action upon the kidneys, and probably also upon the liver.

Boric acid has caused death by absorption from the lower bowel when used as an injection; and also by absorption from a wound in the thigh, where it was used as a surgical dressing. In both cases the post-mortem appearances were intense congestion of the liver and kidneys. Suppression of urine preceded death. Salicylic acid is also sometimes known to cause considerable irritation of the kidneys during its elimination. I have known of at least two cases where this remedy produced an attack of acute nephritis when administered for rheumatism. In one case, where it was self-administered for three years for chronic rheumatism, the patient died of chronic Bright's disease, probably as a result of the remedy, though not positively.

The fatal malady was contracted during the period when the salicylate of sodium was used.

So prominent is this effect of the salicylates, that it is a remedy to be used with great caution in post-scarlatinal and post-diphtheritic rheumatism. Salicylic acid, like a number of the other substances of the aromatic series of coal-tar compounds, is not wholly burned up in the body, but is excreted as salicylate of sodium in the urine, and thus exerts its irritant action upon the kidneys. The long-continued administration, therefore, of either the borates or the salicylates is to be avoided.

The much-vaunted "rex magnus," "preservaline," "boro-glyceride," "fruitaline," etc., all contain one or other of these agents. They are recommended and used to preserve meats, milk, fruits, and various articles of food.

About two years ago a certain brand of milk in this city, which had the indorsement of a number of the leading physicians and divines, was found to contain about ninety grains to the quart of the mixture known as rex magnus—composed of boric acid, borax, and common salt. Salicylic acid is now frequently used to preserve canned fruits. It is not the effect of a small medicinal dose that we here object to, but we do object to being fed upon these substances ourselves, or to have those members of the community fed upon them whose kidneys and livers are already in a state of chronic irritation, congestion, or inflammation, with lessened secreting power.

So much has been said and printed upon the subject of milk as a carrier of disease that I hesitate to add to it here. I will, however, endeavor to give a *résumé* of the present knowledge upon certain points not so often discussed. That milk can take up and convey specific morbific matter can not be questioned. In 1883 Mr. Ernest Hart, in a paper read before an English social science congress, gave particulars of eighty-two epidemics, due to infected milk, occurring between 1873 and 1883. Of these, fifty-three were of typhoid fever, seventeen of scarlatina, and twelve of diphtheria. The whole number of cases of disease traced to this source were:

Typhoid fever	3,500,	with	400	deaths;
Scarlatina	800,	"	120	"
Diphtheria	700,	"	60	"
Total	5,000,	with	580	deaths.

These were only such epidemics as had been positively traced to the milk. Will any one pretend to say how many epidemics, or how

many individual cases, were never investigated or traced to their proper source?

Epidemics of measles, small-pox, and diarrhœal diseases have been caused by the milk supply. All disorders due to filth and polluted waters may be, and frequently are, driven from door to door and sold for seven cents a quart.

Some years ago a number of cases of sickness resembling typhoid fever were traced to a stable in the upper part of New York city. An inspection of the cows showed one of them to be sick. Her milk, on examination, was found to contain pus. The suppression of this milk resulted in the complete cessation of the sickness. An inflamed and suppurating udder may give a milk which will sicken those who partake of it. The danger of milk being specifically infected with contagious epizoötic diseases is not so great as might be expected, from the fact that in most of these diseases, especially in the acute stage, the secretion of milk is greatly lessened or suppressed. The only two diseases of this class in which the milk usually continues to be secreted are pleuro-pneumonia and foot-and-mouth disease. The first of these has not been communicated to the human subject, but a disease similar to the latter has been communicated by the milk. The question whether the milk from tuberculous cows can communicate this disease has been much debated within recent years. In ninety-one experiments with feeding the milk of tuberculous cows to different kinds of domesticated animals, 30·7 per cent. of the animals contracted the disease. It is stated by Stang and others that they have seen the accidental production of the disease in children from drinking warm milk from tuberculous cows.

Without dwelling upon the recorded experiments and reported cases, it seems to be pretty well established that tuberculosis is a communicable disease, and can be produced in a large number of cases, in the lower animals at least, by the ingestion of tuberculous flesh, sputa, or milk. Although there are a few reported cases of the transmission of the disease to children by the same method, this can not be regarded as positively settled, but the conviction that it can be thus transmitted is almost irresistible.

I am prepared to believe that many cases are acquired through tuberculous food in families where heredity is out of the question. For example, in one family coming under my notice, five children died with tuberculosis, when for four generations a death had not occurred from this cause. There is no allegation, however, that the

food or milk was the cause. Experiments prove that the flesh of tuberculous animals is more infectious than the milk. Toussaint found that tubercular lung substance from cows was infectious after roasting in the usual way. Klebs and Ballinger state that boiling does not always destroy the infectious qualities of tuberculous milk.

The question opened up by these statements and experiments is too far-reaching to be entered into here, but it is one of vital importance to us all. Tuberculosis is a common disease among stabled cows. Professor Law says that in certain herds that supply New York city with milk (and the same applies to Brooklyn), 20, 30, and even 50 per cent. are affected with this disease. Not only do we use the milk of these cows, but, sooner or later, we consume most of them as beef. During the year that is just past there were seized in the abattoirs of Brooklyn thirty-one carcasses of beef in which this disease was so pronounced that there could be no question that the meat was totally unfit for use, while one hundred and five showing pleuro-pneumonia were seized. No less a quantity than 86,000 pounds, or forty-three tons, of meats unfit for human food was seized in 1885 in this city. Add to this a considerable amount that escaped detection, and we can form a faint idea of the diseased and unwholesome meat sent to market every year.

It is important to know, if possible, in relation to the wholesomeness of the milk of a certain dairy, not only the health of the animals and their surroundings as to cleanliness, ventilation, etc., but their food, their care, and the purity of the water used to wash the cans or add to the milk.

A sour fermenting food renders the milk acid and indigestible. Distillery waste and brewers' grains are notable examples of this, both of which produce acid milk. I have been able to detect the milk of swill-fed cows by its composition and physical properties, and have traced two deaths directly to such milk. How many deaths in young children have not been traced to this their true cause no one will ever know. How many cases of convulsions or serious illness among children under our care are a form of milk poisoning caused by the milk of cows in heat, overheated and excited cows, or other disturbing causes in the milk, will never be known, and will never be under control.

But we must hasten to speak of another subject of great importance. I refer to what, for a better name, we may call *food poisoning.* Every now and again we meet with cases where some food has caused severe illness in a number of persons, characterized by vomiting, diar-

rhœa, burning or colicky pain, great prostration of the vital powers, cold extremities, feeble, sometimes slow and sometimes rapid, pulse, and occasionally a scarlatina-like eruption, convulsions, or death. Occasionally, also, there is a metallic taste in the mouth, with partial paralysis of one or more of the extremities. In most cases the prominent symptoms are vomiting, colicky pain, prostration, and diarrhœa. In certain cases the cause of the sickness may be in indiscretion or peculiar idiosyncrasy of the person, while in others it is in some change in the food eaten. Among the indiscretions often leading to such sickness we may mention those most likely to occur. First and foremost, my observation has shown overeating of one dish to be a common cause of such attacks. For example, a servant girl, when questioned in relation to her sickness from eating ice-cream, said: "I know it was the cream, for I ate nothing else for dinner. I ate all I could, and then went out for the afternoon." It was a very hot day and she got quite warm during the afternoon, was out in the sunshine a great deal, and returned home sick at evening. Who wonders at it? In another case a child ate six to eight ounces of taffy-candy in a half-hour, and was made sick.

In other cases a meal has been made upon a meat-pie, or, perhaps, a dish of chowder or salad, at eleven or twelve o'clock at night. A can of fruit or vegetables is bought for a meal, and little or nothing else eaten. A greened pickle is eaten, at bed-time, by a child of six or seven and a doctor's bill, a suit for damages, or a funeral is the result.

The results are likely to be more severe if the dish is a very indigestible one, or if it is taken immediately before or after a period of great emotion, as of great joy, anger, or sorrow. I have met with such a case, where three members of one family ate an ordinary meal, consisting of bread, butter, and cold boiled beef, immediately before attending the funeral of a relative. After returning from the funeral they were all taken sick, and vomited the meal undigested. Others who had eaten of the same articles were not affected.

There are, however, cases of undoubted poisoning due to changes in the food eaten. Thus cucumbers and melons, when not fresh, are apt to bring on diarrhœa and vomiting. There seems to be a tendency to develop a purgative substance in all vegetables of the *Cucurbitaceæ* family, to which the cucumber and melon belong. Tomatoes, bananas, and many green fruits have a similar tendency. Commencing decomposition in animal and vegetable food is liable to develop poisonous principles. Meat which has been kept until it is

tender or *high*, and fish that has become tainted, are apt to produce symptoms of poisoning. Until very recent years we have been at a loss to explain these phenomena, but the subject has recently excited a great deal of attention. The results of study and experiment have conclusively shown that proteid substances, while undergoing spontaneous putrefactive changes under the influence of certain low organisms, may develop alkaloidal poisons of the most virulent nature. The poisons formed by the decomposition of such bodies as fibrin, albumin, gelatin, etc., vary with the decomposing body, the organisms causing the decomposition, the temperature, the conditions as to atmospheric contact, and the time which the decomposition has consumed. Some products of the decomposition of proteid bodies are innocuous, while others are more or less poisonous; among the latter there are great variations of activity.

When the decomposition has just begun, there are few of the poisonous alkaloids produced; afterward, they are abundant, and still later they are decomposed and disappear. As a result of the growth of putrefactive bacteria upon animal flesh, the very poisonous alkaloid, neurine, is produced. Apparently, the same organisms, when sown upon fish, produce a different alkaloid, closely allied to neurine, and called muscarine. Neither the time nor place permits me to follow out the description of the various alkaloids found by various observers. They are called collectively ptomaines, or cadaveric alkaloids.

The most marked and uniform symptoms produced by neurine and muscarine are salivation, diarrhœa and vomiting, dyspnœa, paralysis, and death. They also stimulate the flow of tears and the secretion of bronchial mucus. They usually make the pulse slow and weak, but do not arrest the heart's pulsations. Atropine exercises a marked antidotal action to these poisons, checking the salivation, diarrhœa, and dyspnœa, and, unless the dose is very large, prevents death. Choline, another alkaloid resembling the foregoing, but much more feeble in its action, may be prepared from bile or yolk of egg by boiling with barium hydrate.

In some cases of poisoning by fish, cheese, or sausage, the symptoms are so much like those of belladonna poisoning that they suggest the presence of an alkaloid having the physiological properties of atropine. We are all familiar with the excessive dryness of the throat, languor, drowsiness, and scarlet eruption of some of these cases. Paralysis of accommodation, ptosis, etc., have also been observed to exist for a number of days after sausage poisoning.

Dr. T. Lauder Brunton has suggested the use of physostigma in cases showing these symptoms, atropine in those indicating muscarine or neurine, and perhaps morphine in other cases. In general, treat the most prominent symptoms.

In view of the extraordinary activity of these alkaloids, we can easily understand why tainted meat or fish may produce the violent attacks which we sometimes see. This may explain why some persons can not eat eggs without being poisoned by them. Choline is so easily developed from the lecithin which the yolk contains, that some peculiar condition of the digestion probably develops this poison.

But we must not lose sight of one fact of importance here. It is well known that the putrefactive process is going on, more or less, in the living body, and ptomaines make their appearance in the fæces and urine. Any new additions to this process, such as swallowing food swarming with these low organisms, may so increase the process that a poisonous dose of alkaloids may be generated in the intestinal canal.

In other words, we should distinguish between the effects of putrefactive organisms within the body and those of their by-products prepared without the body. In many cases thorough cooking, in my opinion, would prevent the food from doing any serious damage. In fact, I see no other explanation of the occurrence of so few cases of poisoning from tainted meats. There are many families who make a practice of allowing their meats to become slightly decomposed before cooking, and yet accidents are comparatively rare—a fact which seems to show that cooking is a protection, and because it kills the organisms. In my experience but few cases of poisoning occur from recently and thoroughly cooked food. I have known whole families to be poisoned by a beef-stew, or by corned beef which had been cooked for a number of days and then left in the same vessel. Meats protected from the free supply of air are more likely to become poisonous than those freely exposed. Meat-pies, imperfectly preserved canned foods, canned foods left in the can a few hours or over night after opening, meat-stews left in the pot or vessel in which they were cooked, are liable to cause poisonous symptoms.

It is probable that the organisms are more active when cultivated with a limited supply of air—a fact insisted upon by Pasteur in the case of certain pathogenic bacteria. Again, free exposure to air destroys some of the poisons by slow oxidation. All canned

foods should be carefully examined before they are prepared for the table. A putrefactive or foreign odor, a decided change from the normal in color or taste, or an escape of gas on puncturing the can, should condemn it.

The use of a poor grade of gelatin in ice-cream and other pastry is becoming very general. I am of the opinion that great caution should be exercised in its use, as it is capable of doing harm. Putrefaction is easily set up in a mixture of gelatin and other food. For example, a mixture of milk and gelatin becomes an excellent medium for the cultivation of bacteria. In one case coming under my immediate notice, cream that had been melted down and then refrozen caused sickness in a number of persons in a family who ate of it. The melted cream had a putrid taint, and contained gelatin.

There is little doubt that this is the explanation of some of the cases of ice-cream poisoning occasionally met with. The danger above referred to must be much greater in liquid or semi-liquid foods than when it is used in solid foods, because they putrefy more easily. Much of the gelatin used has a decided putrid odor, as sold in the markets, and on this account this process starts very quickly in solutions of it. Further experience and more knowledge is necessary before we can decide upon the advisability of recommending the use of gelatin as a substitute for eggs unless we can insure the quality of gelatin used.

If the hints and suggestions here offered have succeeded in interesting you in a subject of growing importance, one too often neglected by physicians, if I have stimulated in some a desire to inquire into the quality of food foisted upon the public, and if I have shown the importance of a more careful attention to the food of our patients in health and disease, and awakened in you a desire to drive the bad from the markets, substituting for it that which is wholesome as well as good to look at, I shall be amply repaid for this effort.

Dr. G. V. Convery thought that it was best to particularize foods that were adulterated and adulterants. The writer upon this subject in von Ziemssen's "Encyclopædia" made such a classification. There was not much food adulteration here when compared with its extent in other countries. Our supply of flour was so abundant that adulteration did not pay. It was true that we might find from thirty-two to one hundred and sixteen grains of alum in single loaves of bread, but it was introduced to make a whiter article than usual. Flour adulteration with us consisted only in mixing brands of different grades. Alum in flour was dangerous to children, because it made insoluble the phosphates when pap was prepared. We had adulterations of confectionery and arrow-root, also those

of coffee essence. Coffee was often falsified by the addition of beans, chicory, peas, etc. So-called ready-ground coffee very often contained no trace of the article, but consisted of beans, peas, chicory, etc. Tea was adulterated with other herbs. "Overland" tea looked bad, but was good. In its passage across the continent (whence the name) it was shaken and crushed in railroad transit and partly pulverized. Preserved foods presented a rich field for falsification. Many of those that admitted of it were swollen in bulk with gelatin. Apple-sauce was also made of decayed apples, pumpkins, and gelatin. Sulphuric-acid vinegar was well known. Mustard and the chromate of lead and butter and copper mixtures were not infrequent. Cheese and oleomargarine combinations belonged to a later order. Cream was skimmed-off milk and oleomargarine substituted in its place. Cheese was also at times washed with bichloride of mercury or arsenic solutions. Diluted milk was also harmful to young children, or infants depending upon it solely for support. Spice was often composed of powdered "hard-tack" and flavors. Then there were Cayenne pepper adulterations and those of chocolate and cocoa. These various falsifications were alluded to by him because they had not been mentioned in the paper, and he desired to have Dr. Bartley avail himself of them in elaborating the discussion and to indicate to him some additional fields of usefulness as a public health officer.

Dr. Lucy M. Hall related her experience with cooked meats. In an institution with which she had been connected as physician and teacher she had observed several hundred persons. On several occasions there was considerable sickness, commencing with gastric disturbance and lasting some hours, that always followed a certain kitchen experience—that of the meats having been retained closely covered in the pots in which they had been cooked. This mode of preparation and care was always followed by the same results. The former was stopped, and the latter no longer occurred. She was convinced that meat spoiled quickest when kept well covered in the pot or dish in which it had been cooked. She also related an instance in which a well-known brand of condensed milk was for a time discarded in the same institution because of a somewhat similar neglect to properly handle the milk.

Dr. R. G. Eccles was reminded of an Indian experience. A man and wife were taken sick from eating bread prepared at home. On examination of the bread and flour, an alkaloid was found. It had developed in the flour. All specimens of the same lot in different sections contained the same dangerous element. He could not agree with Dr. Bartley in his explanation of the way in which gelatin was dangerous. All pharmacists sold Cooper's glue and French gelatin. It was at first free from all germs. It would keep if well sealed. The production of ptomaines in gelatin was limited. Simple gelatin alone was not used to develop germs. For this purpose it was necessary to incorporate with it some broth. The experience of both Dr. Hall and Dr. Bartley with meat was noticeable. He had seen Indians drive the crows and vultures off stink-

ing carcasses lying on the plains, and eat them themselves without any bad results. He supposed that this was due to the carcasses not having been confined. The putrefactive germs became accustomed to getting along with little oxygen if the matter in which they developed and throve was in a limited oxygen supply, and, if they were then introduced into the human stomach, they managed to live on what little oxygen they could get, and for a time set up trouble. If, however, they throve on a body freely exposed to this gas, they became accustomed to a great deal of it, and died when they entered the stomach, because the supply was inadequate. He was not much interested in beer adulterations. He had not quite got the drift of Dr. Bartley's views with reference to the use of antiseptics in beer. If they were used too early, all germ action would be inhibited, including that of yeast. This would shut off the proportion of alcohol. It seemed to him that, when using salicylic acid, enough would have to be employed to make its bitter taste easily perceptible. The bicarbonate of sodium would help to counteract this, but also the antiseptic effect. He failed to see the use of the bicarbonate of sodium with the tartrates. Beer developed enough carbonic acid itself. There was a difference between the slowly developed beer of the ancients and that of rapid development of to-day. Tyndall and Pasteur said that the new quick beer was the best.

Dr. P. H. Kretzschmar referred to the blackness of Dr. Bartley's account of cases of tuberculosis resulting from the ingestion of the milk of a tuberculous cow. Other causes might have produced the disease. Thus, the first patient might have had it from some other source as well as from the cow's milk. That patient, in turn, might have given it to the next, for instance, by means of expectoration upon the floor, and its subsequent dissemination in a pulverized condition in the atmosphere. Inhalations of this might have affected the next child, and in this way the infection have been propagated from one to the other till all died. He thought it rather strange that Dr. Bartley should conclude, not until after two years, that the ice-cream-poisoning cases he mentioned were the result of gelatin poisoning instead of vanilla adulterations, as he at first reported, because all who were poisoned had eaten this flavor of cream. Bicarbonate of sodium could not be found in beer if added with tartaric acid.

Dr. Little asked if Dr. Bartley had found any strychnine in beer.

Dr. Bartley replied that he had not. In reference to Dr. Conway's remarks he had only to say that the adulterations he had spoken of were mainly found outside of this country and did not prevail here. Many teas that had been examined were found to contain less harmful substances than simply other herbs. It had been said that many fruit-jellies contained no fruit. Out of 360 cans of fruit-jelly actually analyzed, not over a dozen had been found to be made of gelatin. There were, perhaps, some factories in New York and Brooklyn that used gelatin. Out of twenty-five vinegars examined during many years, no sulphuric-acid

specimen had been found, and only one of pyroligneous acid. Vinegar was made cheaply and its falsification did not pay. It had just occurred to him that a few years ago there was a series of cases of lead poisoning in New England. All the flour that these affected people had used came from the same mill. Upon examination, it was found that the miller who ground the flour had filled some holes in his mill-stones with lead. The addition of antiseptics to beer was done at the end of the fermenting process. The bicarbonate of sodium was added only twenty-four hours before the beer was delivered. That removed the objections that had been made. The objection to it was the same that could be urged against taking the same quantity in water. He did not maintain that it was always ingested as such, but it was so excreted. He was not sure, because he could not be, that the five tubercular patients he had mentioned became so from drinking the milk of a tuberculous cow. It was quite certain, though, that they did not develop it from each other, as Dr. Kretzschmar had supposed, for they all had meningeal and intestinal tuberculosis and no tubercular sputa. Concerning the ice-cream cases, he remarked that all the vanilla cream had been flavored out of the same bottle of vanilla before and after the occurrence of the cases of poisoning, so that it could not have been the cause. The total quantity was too small anyway to do any harm. He was not positive that these were cases of gelatin poisoning, but was inclined to think so. As to whether the subjects were poisoned by some alkaloid, he could not say. It took two weeks of hard work to determine that, and for this he hardly had the time.

Dr. Eccles suggested that physicians ought to instruct people as to what were the best and safest antiseptics and disinfectants. Benzoic acid had none of the objectionable features of other members of this group. His last summer's experiments had showed it to be the best fluid preservative.

Meeting of March 11, 1886.

The President, Dr. B. F. WESTBROOK, in the Chair;

Dr. A. H. P. LEUF, Secretary.

The following paper was read:

THE PATHOLOGY AND TREATMENT OF ENLARGED PROSTATE.

BY FRANK. W. ROCKWELL, M. D., BROOKLYN,
CHIEF OF THE DEPARTMENT OF GENITO-URINARY SURGERY AT ST. MARY'S HOSPITAL; VISITING SURGEON TO ST. JOHN'S HOSPITAL; AND CONSULTING SURGEON TO THE HOSPITAL FOR NERVOUS AND MENTAL DISEASE AND TO THE SHELTERING ARMS NURSERY.

IN selecting a subject for presentation to the society this evening I have been guided by two motives—first, the short time allowed me for preparation necessitated the selection of some subject with which constant experience had rendered me familiar; and, second, my own consulting and general practice has given me the impression that, by the profession generally, little attention is given to the treatment of the earlier stages of enlarged prostate, while the general management of its more advanced phases seems equally a matter of routine, based upon vague ideas of the conditions which really exist. Until a very recent period, equally celebrated authorities have differed as to the gross anatomy and physiology of the organ involved; and, as a consequence, many of the phenomena observed in the functional and pathological history of this portion of the genito-urinary apparatus are but imperfectly understood, rendering the treatment of some of its diseases in the highest degree empirical and unsatisfactory. Such being the case, I have thought it worth our while to run briefly over a few of the best-known facts which have been accumulated in regard to the prostate gland itself, and especially those bearing upon the diseased condition which is about to be described.

The adult prostate, then, is an organ resembling in shape and size an ordinary horse-chestnut, lying in the erect position of the body, with its flattened surface upward and its apex applied to the deep layer of the perineal fascia, or "triangular ligament," which here gives passage to the urethra. The base of the gland is applied closely to the vesical outlet, and through it the prostatic urethra runs, coursing along its upper portion in such a manner as to have

the mass of the gland below it, or between it and the rectum. Invested with a true capsule of its own, and held firmly in its place by the perineal fascia anteriorly, and the recto-vesical fascia, or rather a prolongation from it behind and underneath, the prostate shows, upon careful dissection, a complex arrangement of muscular fibers and glandular tissue. The former are derived from and are continuous with the muscular apparatus of the bladder, the longitudinal fibers of the viscus, or its external layer, going to form the mass of the gland at its base, while those of the circular or internal layer (which are a direct continuation of those of the bladder) are prolonged into the gland, and disposed around the tube of the urethra in an annular manner, gradually diminishing in thickness and quantity until they become a thin layer investing the membranous urethra, where they cease entirely on reaching the bulb.

The *glandular tissue*, which, according to Thompson, forms about one third the bulk of the entire organ, is found most freely distributed in what are known as the "lateral lobes" of the organ, or those portions lying to either side of its median line. It consists of a lobular or racemose arrangement of glandular structures mingled indiscriminately with muscle fibers or bundles, having no definite anatomical arrangement, except a tendency to diverge from the center of the lobe toward its periphery, as demonstrated by Kölliker and Thompson. The irregular distribution of these muscular bands leaves numerous interstices, which are filled with the glandular or secreting structure. In the median portion of the gland, along the line of union of its two lateral lobes, another collection of glandular tissue exists, and is most densely deposited at a point which underlies the neck of the bladder. The secretion from all these glands is conveyed by twenty or thirty minute ducts to the floor of the prostatic urethra, where they empty just back of the ejaculatory ducts and along the sides of the veru montanum.

The lobed arrangement which characterizes the prostate is simply the survival in the adult organ of a type which, as in many other portions of the body, exists at an earlier stage of development. Up to the fourth month of intra-uterine life two oval bodies exist, one on either side of the urethra, and at a later period form by their union a single organ. The prostate is richly supplied with blood from three sets of vessels—the vesico-prostatic, branches of the inferior vesical, and pudic arteries. Its blood is returned to the heart by numerous veins, which are collected into a plexus about the neck and base of the bladder, and empty into the internal iliac vein. They

are frequently the seat of phleboliths in aged men, and the source of persistent and dangerous hæmorrhage when wounded, whether by accident or during the performance of operations involving the deep structures at the neck of the bladder.

A free nervous supply is also provided for from the inferior hypogastric plexus which sends a prolongation to the prostate and penis, called the prostatic plexus.

From the brief description thus given, it will be seen that in the prostate gland we have an organ which, by its peculiarities of structure, is liable to processes in which tissue changes of a character resembling those of exaggerated nutrition may easily occur under favorable circumstances. And in this fact the majority of writers upon its diseases have seen sufficient predisposing cause for the condition which is now under discussion. Accordingly, excessive sexual excitement, local nutrition, as modified by gouty, rheumatic, or strumous dyscrasia, or increased by excessive vascular supply, stricture, inflammation, etc., have all been adduced by them as exciting causes of prostatic enlargement. The obvious objection to all these theories is the one adduced by Thompson, that the causes cited are all active during young adult life and manhood, a period at which enlarged prostate is all but unknown, except from acute diseases, which have nothing to do with the common form of the complaint. Approaching the question of ætiology from the opposite side, we find the testimony of all investigators as to the morbid histology of the growth agreeing that two conditions are found: 1. A true hypertrophy of the secreting structures of the gland, or of its muscular elements, or of both, the proportion varying with almost every case examined; or, 2, a true fibrous outgrowth or tumor developing in the substance of the gland and acting precisely as in the other soft parts of the body. In a given case, any or all of the conditions described may exist, the largest masses, usually removed post mortem, containing variable proportions of both fibrous and gland elements, while, on the other hand, a prostate normal in size may contain a small fibrous outgrowth, and, from its anatomical position, be as dangerous to the safety of the patient as its more formidable-looking fellow. Commenting upon the relation of the histology of this affection to its ætiology, Sir Henry Thompson has presented a theory which, to my mind, is so much more satisfactory than those of previous writers that I give it in full in his own words:

It is an interesting fact that the prostate, male homologue of the uterus, should exhibit analogies in many points of view with the latter

organ in regard to its tendency to overgrowth. The most obvious explanation, and the conclusion which, after a careful examination of the subject, is that which appears to me better supported than any other, seems to be offered in the simple fact, now completely established, that the structure in both is exceedingly prone to develop among its component elements minute independent or isolated formations, possessing an organization identical with itself, which formations in the majority of cases do not increase beyond a certain very limited size, and do not interfere with the performance of any known function in either sex, but which, in exceptional instances, continue to be developed for the most part only during a certain limited period of life, say between thirty-five and fifty in the female, and between fifty and seventy in the male; in the one case appearing in the form of uterine hypertrophy or tumor, in the other in the form of prostatic hypertrophy or tumor. Whether the formation of these products is anything more than a contingency of structure—that is, whether it is to be connected with any functional action common to the structure in both cases—is more doubtful.

In spite of this theory, however, the author vigorously combats the idea that hypertrophy of the prostate or tumor is a necessary concomitant of old age. In fact—as has been proved by laborious investigations—it is an abnormal and exceptional condition occurring in about one out of every seven or eight males who have reached the age of sixty, perhaps one out of three having a slight tendency to enlargement scarcely recognizable during life, either by symptoms produced thereby or on physical examination, so that, in general practice, the number of persons who actually suffer from forms of prostatic trouble, needing surgical relief, is much smaller than is generally supposed.

The nature of the complaint, too, the insidious and gradual approach of its early symptoms, and the readiness with which old men apply all sorts of domestic and proprietary remedies to the treatment of their ailments, all serve to keep the patient away from the surgeon until compelled to seek his aid by some new phase of the disease which develops its serious nature.

This is peculiarly unfortunate, because it is at these very earliest stages that much can be done to prevent or favorably modify the course of the disease, and it is then that the family physician is usually consulted, or, at any rate, is made aware of facts which should arouse his suspicions and lead to a thorough examination of the case.

The first thing which usually attracts the patient's attention is an unwonted difficulty in commencing the act of micturition, and a

decrease in the force with which the stream of urine is projected, so that, if water is passed in the standing posture, the stream falls almost directly upon the feet. The patient also notices that, after he has apparently completed the act, small quantities of urine dribble away, soiling the clothing and giving rise to the idea that he is suffering from paralysis of the bladder or incontinence—an idea which is often confirmed by the symptoms which soon follow and will be spoken of presently. Another very common symptom of this stage of the disease is pain, either in the lumbar or sacral region or along the sciatic and femoral nerves.

This so closely resembles the lumbagoes, rheumatisms, and sciaticas of advanced life that patient and physician are both deceived into inappropriate and, of course, useless treatment, during which increased frequency of micturition, aching pains, and fullness in the rectum and perinæum, or about the hypogastrium and neck of the bladder, with increased difficulty in starting the stream of urine, and changes in the appearance and odor of the fluid itself, all excite the patient's alarm and lead him to seek surgical assistance, if he has not before done so.

Many patients, of course, present themselves who have, according to their habits of life and temperaments, complications which at once arouse the suspicion of a watchful physician as to their origin in prostatic enlargement.

Among these are hæmorrhoids, involuntary discharge of fæces accompanying the act of micturition, prolapsus of the bowels, mucopurulent discharge from the urethra, swollen or irritable testis, frequent erections and involuntary seminal discharges, generally occurring at night, hernia from the severe expulsive efforts required to empty the bladder, and various nervous symptoms of a reflex character. These disorders, however, are by no means constant, and are only mentioned because of the important fact I am trying to give prominence to—that the earlier stages of the disease are so easily overlooked by all interested as to be completely masked by the very complications they elicit. Assuming that (as in many typical cases) the disease has progressed to the point just described without alarming symptoms, a new feature now presents itself which merits special description, as upon its correct interpretation depend the proper treatment of the patient and his ultimate safety. This is retention of urine, either partial or complete. Partial retention is altogether the more frequent form at this stage of the disease, and is caused in the following manner:

The gradual enlargement of the prostate, which has been going on for months, possibly for years, before this condition obtains, has resulted in the elongation of the prostatic urethra and gradual elevation of the vesical outlet, so that the floor of the bladder, which normally is an inclined plane sloping toward the urethra, has now become a cup or cavity capable of containing several ounces of urine. The result of this is obvious. The vesical outlet being above the water-level of a portion of the bladder's contents, ounces of decomposing urine are continually in contact with its mucous membrane, and cystitis, with all its complications of calculus, dilated ureters, and diseased kidneys, is or may be added to the rapidly increasing list of the patient's sufferings.

As a direct sequence of these, the contractile power of the bladder is steadily lessened, or, even if hypertrophy of its walls exists, it is incompetent to wholly overcome the resistance of the narrowed and tortuous prostatic urethra, and more or less constant dribbling of urine now makes its appearance, especially at night, when voluntary control is suspended by sleep, while the urine habitually retained in the bladder increases from ounces to pints or even quarts, and the viscus is only partially emptied, even when to its own contractility the weight of accumulated fluid, the pressure of the abdominal muscles, and the advantages of position are all added.

This constant dribbling of urine is frequently mistaken by the patient and his physician for incontinence due to paralysis of the neck of the bladder until, from exposure to cold, dietary excess, or some slight additional irritation to the bladder, complete retention is produced, and the surgeon is enabled to make a correct diagnosis. These are the cases which, undetected or unrelieved, frequently end in death from uræmic poisoning. Where the enlargement of the prostate has been chiefly backward toward the rectum or laterally, so that compression has been moderate upon the urethra, complete retention, unpreceded by overflow or untoward symptoms other than frequent micturition, is sometimes the first symptom which leads the patient to seek medical aid, and commonly follows some irregularity in diet or mode of life. In all such cases a partial retention may have existed for a long time previously, and too much care can not be exercised in making a clear and correct diagnosis of the exciting cause.

On the other hand, a fair proportion of the cases which follow the usual course of gradual impediment to micturition, partial retention, overflow, etc., show, on examination, nothing abnormal in size

or density of the prostate, nor is the urethral curve lengthened, nor the vesical neck lifted up.

Such cases show, on examination, one of two conditions: either a hypertrophy of the median portion of the gland (described by Home as the third lobe) protruding up against or into the vesical outlet, or a fibrous tumor of the variety described in the beginning of the paper, which has gradually grown out of its bed in the gland and become polypoid in its character, just as similar stages mark the growth of submucous fibroids of the uterus.

Having reached such a stage in its history, a prostatic fibroid acts as a ball-valve, and produces many of the symptoms of ordinary prostatic disease, so that in any given case *the absence of enlargement of the prostate, as predicated upon urethral and rectal examinations, is by no means a sufficient reason for a diagnosis of vesical paralysis or incontinence;* and in such a case a more thorough examination will, as a rule, reveal the condition described.

As a matter of fact, paralysis of the bladder (unless caused by spinal or cerebral disease) and incontinence of urine are among the rarest forms of disease in the adult male, and the latter is, as a rule, a certain indication of prostatic disease, the infrequent exceptions to this rule being found in cases of organic stricture of the urethra. Of the advanced stages of prostatic hypertrophy it would, I think, be hardly profitable to speak, except in the way of treatment, since they consist essentially of aggravated forms of conditions already described, or complications in the shape of renal and constitutional disturbances, stone in the bladder, gradual or sudden failure of the vital powers, etc., with all of which you are familiar.

A few words as to the diagnosis of some of the more obscure or uncommon forms of prostatic trouble may not be inappropriate.

Digital examination may be most conveniently made by the method first suggested, I believe, by Dr. Otis, which consists in having the patient stand with his back toward the surgeon, who, seated on a chair, directs him to bend forward as far as possible. The finger, well oiled, is then introduced its full length into the bowel, and the base of the bladder, seminal vesicles, and prostate are examined with care. If familiar with the feel and size of a normal prostate, the physician can have but little difficulty in recognizing any considerable departure therefrom; and, in most cases, the portion of the gland affected, with the character and size of the enlargement, may all be satisfactorily determined by this method of examination. If, however, nothing abnormal is discovered in this manner,

a full-sized silver catheter should, if possible, be passed into the bladder. If urine is discharged through this when only six or seven inches of its shaft have penetrated the urethra, and especially if its handle is not much depressed, no great enlargement exists. If, however, it is necessary to bury it to the depth of eight or nine inches or more before urine flows, and especially if, as it passes, the handle has to be depressed to a horizontal line, an instrument known as a prostatic catheter should be introduced and used, not only to measure the distance of the vesical neck from the meatus, but, by conjoined manipulation from the rectum, to estimate the thickness of the intervening tissues. If, in its introduction, the handle is deflected to either side as the beak passes the prostatic urethra (assuming no false passage to exist), there is a strong probability of unequal lateral enlargement, the greater hypertrophy existing on the side toward which the handle turns. If, however, hypertrophy does not exist to a sufficient degree to account for all the symptoms present, or if a suspicion of tumor or calculus is entertained, the catheter is wholly unfit for purposes of examination, and Thompson's searcher should be passed well into the bladder and rotated by means of its cylindrical handle until its beak occupies the *bas-fond* of the organ, when, without changing the position of its beak, it is partly withdrawn from the urethra. This movement causes its concave beak to hug the posterior surface of the enlarged gland, or to touch any outgrowth or tumor which may be present, thus enabling the operator to form a correct idea as to its size and shape. By repeating the movement and lateralizing the beak, emptying or injecting the bladder through its hollow handle, etc., a very thorough examination may be made, even of obscure cases, and their difficult points cleared up. By one or all of the methods just mentioned, a sufficiently clear idea may be obtained of any ordinary case of prostatic overgrowth to guide the surgeon in his selection of the treatment.

In the earlier stages of the disease, as in those of urethral stricture, much may be done to prevent the development of any, or at least of any *serious*, results in the way of obstruction, retention, etc., and hence the great importance of an early recognition of its threatened approach. For the method of treatment about to be described the profession is indebted to Mr. Reginald Harrison, of Liverpool, who has recently described it in a little pamphlet, "On the Prevention of Prostatic Obstruction," and it is briefly this: Having under his care a gentleman who, several years before, had been informed

that he was affected with the early stages of prostatic enlargement, and who, in consequence of his dread of the disease, had daily passed a full sized gum bougie upon himself, and, having occasion to make an autopsy upon this patient after his death from some other cause, he having meanwhile presented no signs of prostatic obstruction, he found, to use his own words, that, "though the middle portion of his prostate was considerably enlarged, the *level* and *patency* of the prostatic urethra were in no way altered, the growth or enlargement being, as it were, deeply bisected by the canal which the daily use of the instrument had impressed upon it." Struck by the beneficial results of the treatment, as seen in this case, Harrison began experimenting, and has formulated a treatment which he has now successfully used for several years, which is certainly an improvement upon the earlier attempts of Mercier and Thompson, by dilatation or divulsion, and elastic compression.

Immediately on the detection of urinary obstruction the patient is put upon the daily use of an olivary bougie, the size of which is determined by the surgeon, until the patient is wholly competent to manage this part of his treatment for himself. If, for any reason, the daily introduction of this instrument is undesirable or impossible, the patient is compelled to attend to it at least three times a week, upon retiring at night. The peculiar shape of the instrument exercises pressure upon the narrowed canal as it is passed through into the bladder, and again as it is slowly withdrawn—a point which Harrison deems essential, as it corresponds with the direction of the dilatation caused by the stream of urine. Some stress is laid upon the position of the patient while passing the bougie, which should be a recumbent one, with the buttocks slightly raised, the instrument being passed slowly down the urethra until fairly in the bladder, and then gently withdrawn.

This procedure should be at first repeated every forty-eight hours, then every twenty-four hours, and, where enlargement is already somewhat advanced, twice daily, no limit being put to the time over which treatment should extend, simply that it should be persevered in long after all signs of obstruction have ceased. Where any intolerance to the treatment exists, careful inquiry into the presence of abnormal quantities of uric acid in the urine is suggested—a hint which holds good over the entire field of urethral therapeutics.

Where residual urine habitually remains in the *bas-fond* of the bladder, a catheter shaped like the bougie is used, and all the bene-

fits of self-catheterization are added to those just mentioned. I have at present under my observation an old sea captain whom I have directed in the care of his own case for the past six years. During the last four he has been steadily following the foregoing plan, and for the past year has only used his catheter once or twice for a few days, because he fancied his troubles were about to return. When he began treatment he had already had one or two retentions, and was suffering from a chronic cystitis. The first use of the instrument was followed by an aggravation of his cystitis and a swelled testicle, but tolerance was at length established, and he is now free from all obstructive trouble.

In regard to the management of the complications which exist during the early or moderately advanced stages of enlarged prostate, time will only allow the mention of two—residual urine and cystitis —and in both cases the question of self-catheterization is the first to be settled, if ultimate success is to be achieved.

A careful study of the peculiarities of each case can alone determine what form of instrument will best suit a given case, though practically the choice is limited to one or two of the varieties about to be mentioned.

The surgeon must be prepared to give much time and trouble to the examination and instruction of his patient until dexterity and self-confidence have been acquired in the use of the instrument chosen, and then a small stock should be selected by the surgeon himself, and kept by the patient for daily use. He should be instructed in the dangers attending the use of imperfect or brittle rubber and gum instruments, and should pay particular attention to the edges of the eye, lest an irregularity in its surface set up irritation and inflammation of urethra or testicle. All these points being attended to (and they amply repay one for the labor expended), the patient, who may have simply residual urine, is to be treated in accordance with the amount habitually retained, as ascertained by passing a catheter immediately after the patient has passed his water in the ordinary manner. If only two or three ounces are withdrawn, emptying the bladder once a day will suffice, say before retiring; if double the quantity, twice daily; if more is retained than is habitually expelled by voluntary effort, then three times a day—say at 6 A. M. and 4 and 12 P. M.—thus giving the patient longer hours of sleep than he might otherwise procure. I have several patients who use the catheter five or six times a day or oftener; but the rule is as I have just stated. No harm, however, follows the frequent use of a

properly selected instrument, as the urethra is wonderfully patient, and, like the bladder, tolerates a quantity and variety of treatment wonderful to contemplate. Should decomposition of urea have occurred before the case comes under treatment, irrigation of the bladder should be practiced as in cystitis.

Sooner or later, however, in all cases which have not been treated early, and in some of those which have, the latter disease makes its appearance and must be managed, so far as general treatment goes, on ordinary principles.

Each practitioner has his own favorite formulæ. My own preferences are decidedly in favor of the uva ursi, or triticum repens, in combination with buchu, where it will agree with the stomach. Better results are obtained in some of these cases by giving the alkalies, citrate or bicarbonate of potassium, or liquor potassæ, largely diluted; or, where great irritability exists, a strict diet of milk and Vichy, or milk and limewater (equal parts). Irrigation of the bladder by the apparatus of Van Buren and Keyes has, however, given better results than any other treatment with which I am acquainted.

A modification which I have used for some years seems to be such a decided advance that I am sure no one who tries it will return to the old method. It consists in using water, not only tepid, as suggested by Keyes, but *hot*—as hot as the patient can bear it. I have been in the habit of beginning with a solution of borax (about fifteen grains to the pint) at a temperature of 100° F., and injecting a quantity slightly below that habitually contained by the particular bladder under treatment, then by daily additions of an ounce or two, steadily increasing the amount until the whole pint or more could be retained for periods of time ranging from five minutes to two hours. As tolerance was established, I have increased the strength of the borax in the solution to ʒ j, and the temperature to a point limited only by the feelings of the patient. About 112° to 120° F. is the ordinary limit; improvement has been rapid in most cases submitted to this treatment, and increase of comfort obtained in all. Occasional small injections of astringents may be made by the surgeon, such as argent. nit., ℈ j, aquæ, ℥ j, recommended by Gross; or by Thompson for daily use, acetate of lead, gr. j; aquæ, ℥ iv.

The use of opium, belladonna, and hemp by the rectum will aid in procuring rest at night where great irritability of the bladder exists; but for soothing this, where the patient can be visited by his surgeon, Harrison's catheter is one of the best agents at our command.

The model exhibited was sent me through the courtesy of Mr. Harrison, and with it, as you see, the bladder can be emptied, and then, without withdrawing the instrument, a medicated suppository dropped into the organ and left to dissolve. The suppositories I show you contain each one quarter of a grain of extract of belladonna, one quarter of a grain of sulphate of morphine, and three grains of cocoa butter. Iodoform, etc., can be used in the same manner.

So much for the treatment of the principal features of the disease I have been obliged to describe in so hurried and imperfect a manner.

One still remains which I can not omit touching upon, because the utmost resources of our art are often severely tested in its management, and slight departures from acknowledged principles of treatment are often followed by rapidly fatal results. I allude, of course, to acute retention of urine existing as a complication of enlarged prostate. This is almost always due to some exciting cause, such as exposure to cold or wet, slight excess in eating or drinking, unwonted exercise, etc., the action of which, on the sensitive prostate, is to produce congestion or even inflammation, as manifested by muco-purulent discharge from the urethra. The occurrence of retention is usually announced by symptoms with which all are familiar, and the indications for its treatment, viz.—relief of the overdistended bladder—only too plain. But the embarrassments which surround the operation are many. If the patient is one who has been under the care of an intelligent practitioner, and is accustomed to catheterization, but little difficulty is encountered; but in many cases the sufferer is a stranger to the surgeon, who, called in an emergency, must deal with the case as he finds it.

As a rule, soft instruments are to be first employed; and of these my own preference, in case the urethra is undamaged by previous manipulation, is for the rubber instrument known as Nélaton's. This failing, I try the metallic instrument made from a spirally curved wire ribbon, known as Gross's; not succeeding with these, an overcurved gum-elastic instrument, or the French olive-pointed, may succeed. The celebrated catheter of Squires has a deserved reputation in these cases, and was invaluable before the introduction of the flexible instruments now used. If false passages exist, or if the obstruction is due to an enlarged median portion, the elbowed catheter recommended by Mercier may often succeed, or a two-foot guide may be introduced if the canal is *very* narrow, and over it a small

metallic or open-ended soft catheter be conducted into the bladder. Failing in all these attempts, the bladder may in rare cases be still reached by a silver prostatic catheter, an instrument which, in spite of its decreasing popularity, I do not feel like dropping from my armamentarium, as I have succeeded several times in thus emptying bladders upon which everything else had been tried in vain.

Valuable assistance can be given to the points of several of these instruments by a finger introduced into the rectum, and serving to guide them over the obstruction. This is especially valuable in cases where danger of creating a false passage exists, the point of an unyielding instrument being easily swerved from its course, and if undue force is employed entering the tissues about the neck and base of the bladder, or tunneling its way between the prostate and rectum.

I have seen several cases in which death occurred within a few days after the wounding of the deep urethra from instruments used by patients themselves. In one, a patient of Dr. Skene's, an old man of seventy-four pushed a bougie which he had mistaken for a catheter directly into an enlarged median lobe, which, having reached the size of a small fig, lay directly in the track of the urethra, and gave rise to such severe hæmorrhage that the patient yielded to the exhaustion and shock incident to his injury within four days. Another old man of sixty-two, seen with Dr. G. Ostrander, broke a defective catheter in his deep urethra, and, although the piece was passed immediately after, with a large quantity of bloody urine, death ensued in about thirty-six hours. Several patients have within the last six months been sent into my service at St. Mary's with fresh false passages, or copious hæmorrhages, the results of accidents during efforts to relieve retention due to prostatic obstruction. Fortunately for the surgeon, urinary extravasation is a rare complication of the accident under discussion. If the patient survives the immediate hæmorrhage and shock, much can be done to alleviate or even remove the conditions present. The great dangers are hæmorrhage, shock, or pelvic cellulitis due to wound of the investing fascia, or peritonitis secondary to the other complications. A glance at the anatomy of the parts concerned will give the reason for the facts just mentioned. Urinary extravasations, as a rule, occur in portions of the urethra anterior to the triangular ligament, and find their way into the cellular planes which are bounded by the deep perineal fascia, and the sheath of the penis, or "Buck's fascia." Hence we find all grades of inflammatory action following wounds in this vicinity, from

simple perineal abscess to gangrenous destruction of all the tissues contained in the inferior or penile chamber of Tillaux, the scrotum, penis, and cellular tissue of the pubes and abdominal walls.

Urinary extravasation due to injury of the prostate, as just stated, is rare, and, when it does occur, is a most dangerous and insidious complication. The point of injury is, as a rule, some portion of an enlarged middle lobe, and the gland is tunneled backward into the prostatic or superior chamber of Tillaux, giving the extravasated fluids access to the anal portion of the perinæum and sub-peritoneal cellular spaces, and ischio-rectal fossæ. Of course in these cases the genital organs are absolutely uninvolved, and, unless one is on the watch for every new symptom which may follow the infliction of an injury during catheterization, rapid inflammatory and destructive changes occur before the surgeon's attention is called to the accident by any outward phenomena.

These changes are much more serious than those which follow traumatisms in healthy urethræ, from the fact that the urine extravasated is, as a rule, highly ammoniacal and irritating, and the shock proportionately greater than in simpler cases.

Desperate as the circumstances are, patients can occasionally be snatched from impending death by the prompt performance of an external urethrotomy, or the lateral incision as for stone, and treatment appropriate to rupture ofthe bladder.

In approaching the treatment, however, of any given case, should false passages exist, they can in most instances be avoided by carefully studying their position and passing them by keeping the point of the instrument used constantly in contact with the opposite wall of the urethra or by employing Mercier's ingenious instrument which I now show you. The outer catheter of silver is deliberately engaged in the false passage, and then held in position, while through its eye a long soft-rubber catheter, or whalebone guide, is pushed on into the bladder. With patience and care, one of the instruments just shown can be passed in the great majority of cases. And now the query arises as to how much of the retained urine should be evacuated. The answer varies with the conditions found in any given case. If the retention occurs in an old man, whose symptoms are of recent date and whose bladder is only moderately distended, and especially if the stream flows from the catheter in full force as the bladder diminishes in size, thus showing that its muscular walls are in good condition, do not hesitate to empty it. If, however, the distension is great, the bladder reaching, as is not so very uncom-

mon, up to or above the umbilicus, and especially if chronic retention precede, all authorities agree as to the extreme peril of such a course.

Fatal syncope or hæmorrhage is a classic sequel to the procedure, especially if the urine is drawn with the patient in a standing or sitting posture. In all such cases the rule should be to evacuate perhaps a quarter of the bladder's contents, or less; in a few hours, removal of another portion may be attempted, and by a succession of such removals the viscus emptied, and its walls, with their dilated and weakened vessels, returned to their natural state of contraction.

It is in this class of cases that the retention of a catheter is justifiable, especially if its introduction has been accompanied with unusual difficulty, or false passages exist. It should be an elastic instrument (these being tolerated by an irritable bladder much better than metallic ones), its vesical end withdrawn until its eye lies just within the bladder, and its outer end plugged. It may be fastened by tying it to the hair of the pubes, or to loops of rubber adhesive plaster fastened to the skin of the penis. If, in spite of careful and skillful attempts at catheterization, the bladder is not reached, the only resources left are to be found in the different methods of tapping or puncturing the bladder. Of these the aspirator should be first employed, though its use should be confined entirely to the relief of acute retention. An objection frequently raised to its use—that, on withdrawal of the needle, urine is allowed to escape into the surrounding tissues—need never occur if the simple precaution of keeping up the exhaustion during the withdrawal be adopted. I have had many opportunities of studying post mortem the appearance of the punctures made by this instrument in different viscera, and within a very few hours of its use, but have never seen any evidence of its injury to tissues. In fact, it has always been a difficult matter to identify the site of puncture, so rapidly is repair effected.

Having by its means gained a little time, other measures may be adopted which are calculated to give more permanent relief, such as puncture by supra-pubic or rectal methods, which should be considered in the order named (though neither finds much favor among American surgeons), or perineal cystotomy. The latter operation, which consists in opening into the prostatic urethra from the perinæum, and then either dilating or incising the neck of bladder, seems, to my own mind, to be the coming operation, both for permanent

relief for those rare cases not amenable to less radical treatment, and, in cases of obscure disease, tumors, etc., for purposes of diagnosis.

A paper upon this subject appeared a few years ago in the "Lancet," in which Sir Henry Thompson stated that, out of many operations for opening the urethra from the perinæum, excluding stone cases, he had never known a fatal result. The operation has now been extensively used for mere diagnostic purposes, as a direct result of the paper just mentioned, and has within the last two years been practiced and advocated by Harrison as a legitimate method of treatment for prostatic obstruction where catheterism has failed to relieve.

Its author urges the importance of resort to the operation before the tonicity of the bladder-walls shall have been impaired, or aggravated and incurable cystitis renders its success more than problematical. His first case occurred in the person of an old man who, at eighty-two, underwent the operation, the result being rapid atrophy of the prostate and restoration of the power of micturition. Other cases have since been markedly relieved, but without the resulting atrophy gained in the first. A modification of the operation is now advocated by Mr. Harrison, which consists in doing a median cystotomy and, through the opening thus gained, divulsing or incising and removing the obstructing tissues, whether enlarged median portion, intraureteral bar, or fibrous outgrowth, and then leaving in the wound a double elastic tube, through which thorough drainage can be maintained for a period of weeks or months.

The indication for the removal of the tube is found in the fact that micturition begins to occur through the urethra, or that a catheter can be easily passed through that canal into the bladder. This stage having been gained, the perineal tube is withdrawn and a full-sized sound passed at short intervals during the healing of the fistulous opening, which, as a rule, occurs rapidly.

The results obtained in these cases are wholly in accord with observations made in lithotomy cases, in which portions of projecting gland-tissue or fibroids have been caught by the forceps and dragged away with the calculus, showing, as far as anything can be predicated on such rough experiments, that the prostate is remarkably tolerant of interference, *provided* complete drainage exists, and room be made for the swelling consequent on congestion or inflammation of its structures.

A few words as to the general management of cases of enlarged prostate, and I have done. Three drugs are at the present time given with the belief that they exert a direct influence on the disease. I

name them in the order of their value, so far as I have personally been able to judge of their effects, or ascertain the estimation in which they are held by the profession. They are ergot, iodide of potassium, and chloride of ammonium. Of the first of these I can speak in terms of confidence, since I have seen as decided effects from its use as we ever do from therapeutic agents, and in cases where no other treatment was applied. I can see why, on general principles, it should act on the muscular tissues of both bladder and gland, and I give it, accordingly, in full doses.

One of my patients, who had an immense posterior and lateral hypertrophy, and who was relieved of his first retention by the smallest catheter I own, after taking pounds of the drug for a year or two, was completely relieved of his symptoms, and that with no instrumental treatment except that necessary to empty his bladder in a few attacks of retention. Improvement of a marked character was manifest during the first three months of treatment, and I have seen the same benefit in other cases, even where cystitis of a severe grade complicated the original disease. This drug I accordingly give in most of my cases, watching my patient's general health, instructing him in the daily use of the catheter, where chronic retention exists, and also in irrigating the bladder if cystitis exists or is threatened; warning him to report any unusual appearances in his urine, watching its reaction and specific gravity, from time to time, for any indications as to treatment; impressing upon him the danger of being placed in circumstances where he can not empty his bladder at will; also that he shun cold and damp, and protect his skin by suitable flannels worn next it the year through; that he be temperate in diet and drink, and especially as to quantity and quality of the latter, even with water, tea, or coffee, making his daily consumption proportionate to his experience as to his actual need, and warning him that an excess of fluid in his bladder will not be tolerated as in youth; and, lastly, I endeavor to have him acquire regular habits as to the time of passing water, especially if he has to irrigate or artificially empty the organ. Strict observance of these rules makes the life of sufferers from even advanced prostatic disease tolerable, in many cases comfortable.

Dr. Robert Newman, of New York, had almost entirely discarded all old instruments. Some catheters had two holes, but he could see no use for them when it was desired to relieve those with retention from prostatic enlargement. Pus, blood, etc., were found in the urine of these cases, and stopped up the small openings of most catheters. The object was to allow

the ropy, thick mucous strings to pass through the holes of the catheter, and thereby relieve the bladder. Now, the small holes would defeat this object. For many years he had used his own double-cannula catheter for drawing off the urine, as well as for washing out and dilating the bladder. This catheter had two separate cannulas and two openings, one for the injection and another for the return flow. The *one* fenestra for the latter was a large slit near the end of the instrument, large enough to allow thick masses of pus and mucus to pass. This slit was an opening in the middle of the instrument, which was preferable to the old catheters having a small fenestra on the outer side. But such an opening irritated the mucous lining on passing over it. It would be even better to have the opening on the inner side.

The old long curve of the catheter was useful only in very few cases. At present, the short curve gave best satisfaction. In fact, the hand of the operator guided the instrument, no matter what the curve was. He commended Dr. Rockwell's exhibition of almost all the genito-urinary instruments used in such cases, and he might add only filiform guides, tunneled catheters, and Mercier's invaginated catheter. The latter was an ingenious instrument, which often passed over the enlarged prostate when other instruments failed. But in extreme cases it might also fail. He preferred tunneled sounds, which, in his practice, had scarcely ever failed. Sometimes the introduction of a filiform guide might relieve retention for the following reason: The retention was caused by the mechanical obstruction of the enlarged prostate filling up the neck of the bladder. Now, the introduction of the filiform guide pushed the obstruction somewhat backward, and then the water would run alongside this guide and empty the bladder. This little manœuvre had an advantage, as with it micturition would be made a voluntary act, while the drawing of urine by means of the catheter was always an involuntary act. The latter weakened while the former strengthened the muscles of micturition. He preferred firm metallic instruments, which the operator could guide with his fingers, and depreciated the old elastic catheters, which were unreliable, bending like a spring, so that the operator was uncertain where the end passed on. The soft catheters were best for use by the patient himself, as he could do no harm with them. He employed for enlarged prostate rectal suppositories of potassium iodide, hyoscyamus, and nux vomica. Sometimes there was slight constipation, due either to the patient's condition or to the medicine. In such cases he added one grain of extract of colocynth. It did all the good required, though but a single grain. For spasm he added a small quantity of belladonna and with it a little opium. Some peculiar idiosyncrasies were met with at times. He had had a patient that very morning who, although he took but one tenth of a grain twice a day, had such decided pupillary dilatation as to make his sight defective. Another patient took, by mistake, a suppository of four grains of belladonna and did not have the slightest discomfort. He usually gave one grain of belladonna and one quarter of a grain of opium in one rectal

suppository. Dr. Charles Mitchell, of Philadelphia, made these gelatin preparations for him to his entire satisfaction. At best, all treatment for the enlarged prostate had not been satisfactory, and, as a large majority of old men suffered from the malady, it would be desirable to establish a more rational method of cure. For the last five years he had thought of applying galvano-cautery directly to the hypertrophied prostate. After many trials and hard work he had at last succeeded in constructing the instrument, and had used it for some months with success. His instrument consisted of a smooth metal catheter, with a fenestra at the end of the curve, in which was placed a platinum wire. In the interior of the instrument was the mechanism for heating, which was done by a galvano-cautery battery. It might be done by a storage battery or even by a dynamo-machine, but the cautery must be under the absolute control of the operator. The other end of the instrument was straight and formed the handle; from this end emerged two wires, the heat conductors, which were connected by binding screws to conducting wires, which respectively went to the positive and negative poles of the battery. The current-breaker was attached to one pole at the handle. The instrument was introduced in the urethra, so that the fenestra was held against the enlarged prostate, which was then cauterized in an instant by the galvano-cautery. The instrument was light and in size equal to No. 18 French scale. The instrument and the battery must be regulated to a fixed potential for the work to be done, and so adjusted that failure was impossible. These applications were repeated at short intervals, until a cure was effected by shrinkage of the tissues. The galvano-cautery must be applied lightly, the flash of heat being instantaneous, or at most not lasting longer than a few seconds. As the same quantity of electricity under the same circumstances would always do the same work, it was essential to measure the electricity, and thereby make failure impossible. The advantages of this method were: the operation caused no pain or hæmorrhage, and patients were not detained from their business on account of the operation itself.

The same instrument had been used for the treatment of hypertrophied tonsils. Dr. Newman had used it also with success in other diseases—such as spermatorrhœa, impotence, and diseases of the bladder and urethra. If nothing else relieved the patient, it was best, as Dr. Rockwell had mentioned, to perform perineal section and make a digital exploration, in which case he would combine galvano-cautery to the prostate. Professor Bottini, of Italy, had reported two cases in which he had used the galvano-cautery *per urethram* with a different instrument. He had burned through the prostate for forty-five seconds, which was a severe operation.

Dr. Andrew Otterson said that the only relief or cure was the removal of the mechanical trouble. The mechanical removal was experimental to a certain extent. He had succeeded best with a large prostatic catheter. One of the very best things he knew of was the fluid extract of hydrangia,

first introduced by the late Dr. Butler, of New Jersey. As prepared by Dr. Butler, it gave more prompt and comfortable relief than any other remedy he had ever used. He had, like all others, had much trouble in overcoming obstructions. He never had the courage to use the knife. Since the advent of iodoform he had had a case of enormous enlargement nearly filling the pelvis, and by the interrupted use of iodoform it had been so reduced as to give no further trouble. This patient did not have to be aided by the catheter in over a year. He had been obliged formerly to come a distance of many miles to be relieved whenever he had retention. It was impossible for him to say whether this was the effect of iodoform in all cases. He also had had one other case. It was that of a lady whose trouble had been diagnosticated as prolapsed ovary. She was almost bedridden and very much exhausted. She had been to the best men in the city, but without avail. She recovered under the use of iodoform, and was able to get around very well. So confident was he that the success was due to the iodoform that he would use it again in a similar case. He always gave it *per rectum.*

Dr. Eccles asked, Why give belladonna when it was desirable to get a decided effect? Atropine should always be given to insure success. The battery also, unless gauged to the wet condition of platinum, would yield no result from a single flash. It was at first necessary to have the platinum dry before the flash was obtained. Resistance was necessary to make the wire hot.

Dr. Jones asked if any one previous to Dr. Newman had systematically cauterized the urethra. He also called attention to the analogy of the prostate and uterus, and the frequency of fibroids in the uterus of negresses, and wished to know if there was a similar tendency in negro men to fibroid changes of the prostate?

Dr. Rockwell said he was aware of Professor Bertini's effects with the cautery. He asked Dr. Newman how much iodide of potassium he used in his suppository. He also believed perineal cystotomy to be the coming operation.

Dr. Newman replied, in answer to a question by Dr. Eccles, that of course the battery must be gauged before each application, and that he did so. The time would come when the amount and intensity of electricity would be exactly known before each application. He knew that the wire would not get so hot in the urethra within a given time as in the air. In reply to Dr. Rockwell's query as to the quantities of the ingredients of the suppository, he said that each one contained two grains and a half of iodide of potassium, one grain of extract of hyoscyamus, and one grain of extract of nux vomica, and, if necessary, one grain of extract of colocynth.

Dr. Rockwell concluded by saying that the urethra had been cauterized by others before Newman, but not so systematically. He had never seen a case of prostatic fibroma in a negro, but then he seldom saw negroes professionally. He was familiar with the iodoform treatment, but was not favorably impressed with it. He employed it to relieve pain

sometimes. He had also injected potassium iodide with the hypodermic syringe.

Fatty Heart; Pericarditis; Thrombosis of the Left Subclavian Artery and Gangrene of the Left Hand and Arm.—Dr. JOHN HORN exhibited specimens and said that the first was removed from a female about forty-eight years of age, who had been under treatment for pneumonia for three weeks at St. Mary's Hospital, and who was on a fair way to recovery when one morning she experienced in the fingers of her left hand a peculiar numb sensation which came on suddenly; it was then noticed that her hand was becoming cold and painful; her finger-nails became blue; mottled spots appeared on the hand the next day and gradually extended up the arm to about the junction of the middle and lower thirds; there was no pulsation in the radial, brachial, or ulnar arteries; the left hand and arm gradually grew darker, and the veins of the hand soon became distended and assumed a greenish color. She was well stimulated and her arm was wrapped in cotton. Being a very nervous patient, she worried a great deal about the condition of her arm; also, being physically weak, she rapidly failed and died on the sixth day after the embolus was first noticed.

The autopsy was made on the following day by Dr. Leuf. The body was well nourished. There was no rigor mortis in the left wrist or fingers. The pericardium was adherent and there were recent adhesions between the pleura and the pericardium on both sides. The right auricular wall was thickened and the cavity diminished. The right ventricles were hypertrophied, the walls shading off into fatty degeneration. Between the layers of the pericardium there was a sack which contained a purulent fluid. The left auricle was small. There was atheroma of the aorta down to and below the abdominal portion. There was œdema with hypostatic congestion of the left lung. The lower lobe of the *right* lung was collapsed; the upper lobe was solid and appeared as if it was about to break down.

The capsule of the left kidney was slightly adherent. There was chronic interstitial nephritis of both kidneys. The liver was pale but not friable. The clot extended from the beginning of the subclavian artery at the aorta to and into the ulnar and radial arteries, where it had not broken down; it was a solid, black clot.

Tricuspid and Mitral Stenosis and Regurgitation.—Dr. HORN also related the history of the case of Eliza M., aged thirty-two, a domestic, who was working up to five weeks before admission to the hospital, when she complained of cough, and of pain in the cardiac region and head. She expectorated a dark, yellowish sputum, and had dyspnœa on slight exertion.

On admission, she had a slight elevation of temperature, was very anæmic, and slightly jaundiced, and had œdema of the feet and legs, a soft compressible pulse, and a marked carotid pulsation. The apex-beat was at the fifth intercostal space, one inch to the left of the nipple. The first

sound was very feeble and was preceded by a harsh murmur. There was a distinct bellows murmur at the apex and a very feeble second sound. The urine was acid, of a sp. gr. of 1·012, and contained albumin and some granular matter, but no casts. She came to the hospital on February 27th, and was put to bed and stimulated. She felt very comfortable the next day, but became comatose four days after, and at about 1 A. M. on the fifth day after admission she died.

Autopsy by Dr. Leuf eighteen hours after death: The body was fairly nourished. Rigor mortis was well marked. There were recent pleuritic adhesions on both sides. The heart was enlarged and anæmic. The mitral and tricuspid valves were thickened and retracted. The aortic valves were slightly thickened. All of the abdominal organs were very anæmic. Both kidneys were enlarged and very fatty, and the capsules were adherent.

Cardiac Hypertrophy and Dilatation with Chronic Diffuse Nephritis.—Dr. HORN also exhibited a specimen which was taken from Henry B., forty-eight years of age, who came to St. Mary's Hospital with the following history: For several years he had been treated alternately for kidney, liver, stomach, or heart disease. About four months before, his legs and scrotum become very œdematous. He had pain in the lumbar region, dyspnœa, and orthopnœa, and he very frequently had peculiar spasms, during which his breathing would assume the character of Cheyne-Stokes respiration. These spasms rarely came on while he was conversing with anybody, but, as soon as he was alone and his attention not occupied, he would throw his head backward, close his eyes, and almost unconsciously moan very loudly for a few minutes, during which the Cheyne-Stokes breathing would occur, after which he felt relieved. These spasms had existed for some time. He passed a normal quantity of urine daily, had a poor appetite, and was very much emaciated. His urine was acid, of a specific gravity of 1·017, albuminous (one fifth), and contained hyaline and granular casts. The apex-beat was not discernible; there was a strong epigastric pulsation. He was made very comfortable with hypodermics of pilocarpine, hot baths, and infusion of digitalis, and his spasms were relieved with morphine. The quantity of albumin in the urine gradually diminished. His œdematous prepuce and scrotum were punctured, and twenty-one ounces of fluid oozed out in about twenty-four hours.

On March 6th, sixteen days after admission into the hospital, he began to fail rapidly, became cyanotic, and died quietly the next day.

On March 8th the autopsy was made by Dr. Leuf. Rigor mortis was marked. The skin of the upper portion of the body was jaundiced; there was œdema of the lower portion. The apex of the heart was located at the sixth interspace, one inch to the left of the nipple. There was hydropericardium, and the heart was enlarged and dilated and weighed twenty-one ounces. The aortic orifice admitted two fingers and there was a slight thickening. The valves seemed competent. There was atheroma of the aorta, which extended into the common iliacs. There were pleu-

ritic adhesions on both sides. There was hydrothorax on the right side. The lower lobe of the left lung was collapsed. There was a hæmorrhagic infarction in the lower portion of the upper lobe on the inner side. The lower lobe of the right lung was also collapsed, and it contained a hæmorrhagic infarction near its outer side. There was pneumonic consolidation of the right apex. The left kidney was enlarged and weighed ten ounces and a half. The capsule was not adherent; the pelvis and infundibula were dilated. The right kidney was very much smaller and weighed two ounces and a half. It was nodular, the capsule was thickened and adherent, and its surface was granular. Both kidneys were floating. The pancreas was normal. The stomach was tubular; the pylorus was contracted and adherent to the left side of the gall-bladder and to the lobus quadratus of the liver. The liver weighed sixty-four ounces. There was interstitial hepatitis. The gall-bladder was contracted and contained one large stone and several small ones. The spleen was hard and congested and adherent to the diaphragm, and its capsule was thickened. The urinary bladder was dilated. The prostate was not enlarged.

The PRESIDENT remarked that the last case was of special interest because of the adherence of the stomach to the liver near the gall-bladder and the dilatation of the kidney, ureters, and bladder, without prostatic enlargement or stricture, and he asked what caused the retention.

Dr. HORN suggested that a marked œdema of the prepuce that was present might have interfered with the proper flow of urine.

Dr. ROCKWELL called attention to the inter-ureteric bar, composed of muscular tissue, and made prominent by muscular contraction. It was not very evident *post mortem*, although large enough very often during life to cause urinary retention. It was simply a ridge passing along the *bas fond* between the orifices of the ureters. He desired to know if it was present in this case.

Dr. LEUF replied that, in the first place, a metallic catheter of average size was readily passed through the urethra and withdrawn through the vesical orifice, thus proving the absence of any stricture likely to cause retention. In the second place, he did not believe that the œdema of the prepuce, though very great, could prevent the escape of urine, as there was no phimosis. In the third place, the prostatic angle of the urethra in this case was a very decided one. It was obtuse, of course, but measured not more than 100° or 110°, and that might prove an effectual impediment to the flow of urine during life. In the fourth place, the inter-ureteric bar was present in this case and appeared as a round ridge running from one ureteric orifice to the other, and had a diameter of about 5 mm.

Aneurysm of the Arch of the Aorta.—Dr. C. N. D. JONES presented a specimen with the following history, a portion of which was furnished by Dr. Morrel, of the Brooklyn Hospital: Alexander D., aged thirty-two, single, colored, a native of the United States, came under his observation

February 4th. The patient's family history was negative. He was one of the "Jubilee" singers. He stated that about one year ago, after an evening's performance, he had noticed a dull pain in the left chest. Three months ago he had first noticed a tumor in his left infra-clavicular region, which had been slowly but steadily enlarging. The patient suffered with pain, dyspnœa, cough, dysphagia, and aphonia. Examination showed the chest-wall bulged forward by a large pulsating tumor. On auscultation, there was a double murmur, with the unmistakable aneurysmal thrill. The patient was sent to the Brooklyn Hospital, where he remained until he died, February 25th. The treatment consisted of the use of iodide of potassium and opium. Large doses of the latter were required to ease his pain. At the autopsy the heart was found to be but slightly enlarged, the valves were competent, and the muscular tissue was of normal consistence. The whole arch of the aorta was markedly atheromatous and somewhat dilated. Just beyond the origin of the left subclavian artery it was dilated into an aneurysmal sac of the size of a large orange. At the inner portion of the large sac a secondary sac was given off, extending inward and to the right, where it pressed upon and had become firmly adherent to the trachea. The smaller sac, together with the adherent portion of the tracheal wall, was firmly calcified—apparently an effort of Nature to protect herself against the encroachments of the enlarging tumor. The other organs presented no lesions worthy of note. The case was interesting because of the rapidity of the growth of the tumor and the absence of symptoms until within a short period before death.

Meeting of February 25, 1886.

The President, Dr. B. F. WESTBROOK, in the Chair;

Dr. A. H. P. LEUF, Secretary.

ON THE PATHOLOGY OF SURGICAL INFECTION AND THE VALUE OF ANTISEPSIS.

BY A. H. P. LEUF, M. D.,

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THE subject of which it is my intention to treat this evening is so replete with food for thought and discussion that it seems endless. It also is inseparably connected with general infection, so that a discussion of the one necessarily involves a consideration of the other. No sharp lines can be drawn between the two. While it is my intention to treat the selected subject thoroughly, an effort will be made to refrain from all unnecessary mention of extraneous matter. Exception will be taken against the now so prevalent extreme methods of antisepsis during operation and subsequent thereto.

Personal experience in the frequent handling of dead bodies in various stages of decomposition and dead of all kinds of disease, in connection with operative surgery, privileges me to have a say.

In this day of specialization also, when everything is apt to be viewed from only one standpoint by each individual, and this standpoint depending upon the special work the viewer is engaged in, it behooves some one having a more general interest in our work to look upon everything from all possible points of view for the purpose of establishing relative values. The neurologist, for instance, will claim every pain or ache as coming exclusively within his particular domain, while the operative surgeon will insist upon its being permanently curable only by instrumental interference.

Recognizing the scope and depth of this subject, the limited time allotted for its consideration, and being desirous of treating it fully and yet concisely, an effort will be made to arrange it in a systematic manner.

It is the object of this paper to take up the healing of wounds, the methods of so-called surgical infection, the cause of excessive surgical fever, the prevention of this condition, and the value of the

general application of the germ theory and its logical outcome, antisepsis.

The prevailing fashion of unnecessarily lengthening a paper with a long bibliographical list will be ignored, and only such few references made as seem advisable. Advantage is hereby taken of this opportunity to again call attention to that most remarkable work of its kind —"The Index Medicus." It should replace all those needless tails of reference that we find tied to papers of all grades. More numerous and complete references can be found there of the current literature on this subject than any single individual could otherwise collate.

Wounds heal essentially, but in two ways. These may be, and by some are, denominated primary and secondary. The first occurs without the formation of pus and the second is accompanied by suppuration. In the latter we have granulations and granulation tissue, while in the former healing takes place without granulations, although the process of repair results in an identical tissue.* Repair in all instances is effected only by the cell. The participation of the blood-vessels in this process is secondary, and their secondary function is to nourish the cells that are doing the work, thus continuing proliferation and growth.

All living tissues have common and special power of reaction. The common reactions are those of mere vitality, while the special reactions are the result of the performance of duties not essential to life. Thus every cell does the common work of maintaining itself. In addition to this, cells do their own special work as living individuals; for instance, the ordinary connective-tissue cells, which form

* By suppuration I mean any fluid exudation from a wound's surface containing multinuclear cells—leucocytes. The so-called "union by granulation without suppuration" of the antisepticists is only apparently true. One object of suppuration is the protection of the granulating surface from extrinsic influences, particularly over-dryness and hardening of the surface. In proportion as there is diminished chance of evaporation there may be lessened pus-formation, and more especially is this true when the surface is well protected by sponge or other suitable material and dressings that are more or less sealed. This is true in very much the same way that it is that the amount of callus in a fracture depends largely upon the irritation of the broken ends of the bone and their displacement. I am well aware that this view of suppuration may seem new, but, be that as it may, it is the sense in which the term is employed throughout the paper. Any exudate from a granulating surface will be found to contain leucocytes, and therefore is pus. It may only be detectable by its effects in preventing dryness and hardening of the surface. There is no such thing in reality as "healing by granulation without suppuration."

the framework that supports the essential elements of an organ and its nutrient vessels and nerves; or the cerebral cells, which preside over the volitions of the body and the associations of its various workings; while the liver, kidney, pancreatic, and red and white blood-cells are still different. It is by their common reactions that cells or tissues overcome disturbances. Let there be a breach of continuity in any of the tissues, and the steps by which the injury is overcome, or attempted to be overcome, are essentially the same in all. Perturbing influences, whether slow or sudden, will have definite effects upon all structures, but often as different as are those structures themselves. A wound of the brain and one of the skin heal essentially in the same way, but the manifestations and results are not alike. In the same manner a similar disturbing cause will affect differently various people or groups of people.

The connective-tissue cell is the essential element of the body's framework. It binds together all our different parts. Whenever there is a breach of continuity, it is the *special* duty of this cell to make the necessary repair in restoring continuity. This is but in accordance with all physiological processes, as continuity depends upon the connective tissue, and when continuity is severed this tissue is injured. Those elements which happen to be enjoying the support of this structure at the seat of the wound have no connective function, they do not aid in the repair, they are injured and they die.

Repair is effected by proliferation. All the lower tissues proliferate when sufficiently disturbed, while the higher tissues never do. In inflammation the higher tissues perish, while the lower tissues increase. These lower tissues are embraced by the great connective-tissue group. If higher structures proliferated, a man with nephritis or hepatitis ought to get larger and better kidneys and liver on that very account, but the truth is that the framework of the organ (the lower or connective tissue) is increased, while the higher, the essential secretory structure, is diminished—destroyed.

In all solutions of continuity, therefore, we have increased life and activity, proliferation of the connective tissue, on the one hand, and diminished life and activity, death of the special cells, on the other. The dead elements are removed by absorption or by ecrysis. If small, as in a simple incised wound, absorption is the rule. If large, as in a lacerated or contused wound, ecrysis predominates, and we have a slough or gangrene. There may be, and often is, absorption without ecrysis, but never the latter without the former.

Proliferation is reduced to a minimum in primary union, and is

excessive in healing by granulations. The former it is almost always our object to attain. The latter may conveniently be divided into three stages, as will appear. When a wound is just made there is a transudation of blood from its surface, and this is soon accompanied by a flow of lymph. A variable time after the trauma (depending upon its site, extent, and the patient's condition) there is added a flow of serum, and the hæmorrhage gradually subsides, until eventually there is no longer any transudation from the surface of the wound. It begins to take on a glazed appearance, due to the coagulation of albuminous matter, variously known as coagulable lymph, plastic lymph, plastic exudate, etc. Somewhat in the same way as microbes are developed from gelatine and animal broth (nutritive gelatine), we find the superficial connective-tissue cells of the wound's surface increase in size and number. The glazing of the surface takes the place of the microbist's gelatine, and the adjoining blood-vessels represent the animal broth. The wounded connective-tissue cells begin the reparative process. The increasing cells push forward like an advancing army, and the blood-vessels throw out closely following loops in the same way that the food-supply follows a body of soldiers—their functions are similar.* These loops, covered with cells, form granulations. Cell formation is so rapid that many are thrown off with modified serum to form the pus that covers the granulations and protects them from dryness and other disturbing influences.

The three stages into which the healing of an open wound may be divided are—

1. The period extending from the reception of the injury to the glazing of the wound.

2. The time between the glazing of the wound and the formation of granulations and pus.

3. From the formation of pus to the end of repair.

The healing of wounds is retarded by two sets of causes—local and constitutional.

* I arrange myself by the side of those who do not believe the migration of leucocytes through the vessel-walls—diapedesis—to be essential to the inflammatory process, because of repeated failures to observe it after the most careful and persevering observance of an active inflammatory field. What I have seen appeared to be a proliferation of the vessel-wall, either inward or outward, or both conjointly, and this agrees with Professor Daniel Ayres's views on this subject. Still, I do not wish to be understood as denying the possibility of diapedesis, and the probability of its inconstant and infrequent occurrence. It seems to me most proper to define inflammation as increased cellular metabolism, with a failure to remove all or a part of the exudate.

The local causes may be said to consist of—1st, anything that will prevent perfect coaptation; 2d, anything that will reduce the local tonicity; and 3d, all sufficiently irritant foreign bodies. The first includes everything that separates the edges of the cut surfaces, and these may be large solid foreign bodies, blood, lymph, serum, water, air, gas, and drains of all kinds, as tube, horse-hair, or silk. The second comprises devitalizing or benumbing fluids and gases, and even a too free and continuous supply of water. The third consists of all kinds of irritating substances.

The constitutional causes are readily divided into nervous, muscular, vascular, and nutritive. General neurasthenia, in the broadest sense of the word, whether it be due to heredity, some chronic or acute disorder, or to anæsthesia, will materially retard or altogether prevent repair, if not properly and promptly counteracted. Lack of promptness may, and occasionally does, involve a loss of life, in consequence of the drain upon the vitality of the patient in ineffectual efforts at union. A flabby muscular apparatus will often, in spite of a fair nervous tonicity, be a barrier to typical repair, causing delay and sometimes failure. Vascular disturbances, by directly modifying local nutrition, interfere with the healthy healing of a wound as insufficient food supply diminishes the effectiveness of individuals who have to perform a given work within a specific period. General nutritive disturbances, as impairment of the functions of the stomach, liver, or kidneys, retard or prevent primary union, and sometimes even normal granulation, by diminishing the general vitality or resisting power.

Elevation of temperature a few degrees above the normal standard is called fever. Such elevation, however, is as normal in some pathological conditions as is the standard in health. Various affections have different thermic elevations peculiar to themselves. The reactionary rise of body heat after hæmorrhage or injury is normal under the circumstances by which it is caused. That either general or local irritation will cause such a rise is beyond question. Even excessive anger runs the mercury up the scale.

Most foreign bodies irritate. Dead animal matter is a foreign body. It becomes particularly obnoxious while in process of decomposition. The dead elements on the surface of a wound between the connective-tissue meshes, therefore, are foreign bodies if not quickly absorbed, and produce a detrimental effect. The normal bodily temperature is most favorable to rapid putrefaction, and hence to rapidly converting its own dead tissues into sources of irritation.

This is more especially true of lacerated wounds for self-evident reasons.

Many local irritations produce general disturbances. Increased activity of the cerebral cells, as in mental concentration, sufficiently perverts the metabolism of the whole body to elevate the temperature several degrees. A simple neuralgia due to neuritis will have its marked effect upon the body. Likewise a common felon. The same may be said of the painful recovery from an over-worked muscle. Many of these bodily disturbances are ætiological factors in elevated temperature—fever.

Nervous excitations not appreciable by the mind cause reflex disturbances. As an example, take the gravid uterus and its accompanying emesis. Peripheral nervous irritation may be caused by a nerve being compressed, or under tension (stretched), or in contact with some irritant. An abscess in a dense tissue produces greater disturbances than one located in a very yielding structure. This is because in the former instance the local disturbance of the blood and lymph-vessels and the nerves is greater than in the latter. An abscess grows, especially when it is encapsulated from the inner side of its wall. Surrounding structures are pushed aside. All intervening vessels and nerves are disturbed. The denser the tissue and the greater the abscess, the greater is the effect upon the body. Take, for instance, the general effect of a periostitis with effusion of pus between the bone and membrane. Here we have two very unyielding structures and a marked constitutional effect. Again, take, for example, the constitutional effect of congestions or inflammations of the tonsils or mammæ. From this it is safe to say that—

Those tissues which have the richest nerve supply and the densest consistence, as a rule, give rise to the most marked constitutional disturbance when congested or inflamed.

Hilton * has done perhaps more than any other single individual to demonstrate and emphasize the influence upon the body, as well as diagnostic importance, of pain, and the great therapeutic value of rest. Gamgee also deserves credit for valuable work of the same kind. John Hilton made elaborate dissections to trace out the finer nervous ramifications, and compared them with the clinical facts of his surgical experience. His investigations were thorough and far-reaching. He was one of the first to show a definite relation in

* His remarkable work on the "Diagnostic Value of Pain, and Therapeutic Value of Rest" is one that no scientific physician can afford to neglect to read and study.

many instances between thermal elevation and nervous irritation. He also proved that great attention was due to the nervous system, both general and local, in the repair of tissue, and that, too, whether or not the air was made a factor by contact with the lesion. He firmly fixed the one great fact, that the more perfect, absolute, and continuous the rest of an injured part, the more favorable were the conditions of repair, and the greater certainty was there of complete, rapid, and satisfactory recovery. Rest has such great therapeutic power because it results in a comparative increase of tonicity by enabling all the forces operating at the seat of injury to concentrate themselves upon the process of repair alone.

A bleeding surface does not absorb. A surface exuding plasma or serum does not absorb. A cover or envelope of coagulated albumen prevents absorption by the surface underneath. A wound, from the time of its inception until its proper closure, is under these varying conditions at different times. At first there is hæmorrhage, then an exudation of plasma and lymph, which is subsequently followed by the coagulation of the albuminous constituents of these fluids. During this time absorption is impossible. It does not occur. When the wound is covered with this coagulated layer, it is said to be glazed. When a wound is properly glazed, there is no longer any exudate.* Given a wound in this condition, and free from irritant material, with perfectly coaptated surfaces, and their constant maintenance in this relation, and the result will be primary union. If such surfaces are approximated before glazing is complete, there may be, and as a rule is, still a little oozing of fluid, consisting of blood, plasma, lymph, or all. Given a wound with surfaces approximated, but imperfectly glazed, and gradually a foreign body, the exuding fluid, insinuates itself between the surfaces, separates them, irritates them and the subjacent cells, primary union becomes impossible, and if the tension becomes sufficient or the fluid undergoes chemical changes and thus becomes sufficiently irritant, a general disturbance of the whole body with a rise of temperature is the inevitable outcome. This a great many misname septic infection.†

* By "glazing" I do not necessarily wish to be understood as meaning an albuminous coagulate sufficiently thick to be easily appreciated by the naked eye; but what I do intend is the cessation of exudation, with relative dryness and more or less gloss of the surface.

† For the sake of clearness it is perhaps well to state that it is not intended in this paper to use the term "primary union" as synonymous with "primary adhesion." The idea expressed by the latter term is a fallacy, as it supposes that two normal surfaces can adhere and remain united without the inflammatory process

Glazing requires a variable period. It varies at different ages, in different individuals of the same age, and in the same individual under different circumstances. Glazing depends upon the tonicity of the wound, and this in turn depends upon the local and general conditions already indicated, or is diminished, or destroyed, by the cause above cited.

A cause of atonicity of wounds now exists, and will remain with us, that our predecessors up to the earlier half of this century did not have to contend against. It is not appreciated at the present day except by a few. Attention was recently called to it by one of our most reliable surgical authorities—an unimpeachable observer. He saw the steady inroads that this cause was making in marring the success of those surgeons who, previous to its advent, seldom met with failure. Prevailing methods, previously satisfactory, became unpopular, and were abandoned. Primary union was becoming a thing of the past. Surgeons all over were resorting to the open treatment of wounds—union with suppuration. It was noticed, but not explained, that wounds that were gently handled and left to themselves for open treatment, and on second thought, at the end of half a day or a day, were dressed for the purpose of obtaining primary union, resulted in union without suppuration more frequently than those that were dressed for this purpose immediately after the operation or injury. Few men, if any, at first saw any relation between the advent of anæsthesia and the proportionate failure of primary union, and it seems that those who did considered it only an unaccountable coincidence. Hamilton * dwells especially upon the retardation of glazing produced by the use of anæsthetics. He appears to be the first to have laid much stress upon this important point. It is directly due to local atonicity, and this in turn is caused by the general flaccidity induced by etherization or analogous conditions.

The retraction of cut tissues of an anæsthetized patient is not as great as those of one who is conscious. Operations upon paralyzed limbs do not succeed as well as those upon extremities that are not paralyzed. This difference is best observed in hemiplegics who have

that inevitably accompanies trauma. By "primary union" I mean a union which results without suppuration or surface granulation, and which it is not safe to disturb inside of several days, and which even after that time may be resevered without very much effect. This is the most advantageous union that can be attained, and its rapid perfection in suitable persons has led to the misconception —"primary adhesion."

* "The Art of Primary Union," N. Y. "Med. Record," January 2, 1886.

both sides injured. Careful surgeons have a well-founded temerity about operating upon enervated structures.

The large failure of primary union after the advent of anæsthetics as compared with previous successes depended upon the diminution of tonicity produced by these agents. This mode of repair more often succeeded in those instances where the dressing of the wound was postponed for many hours than in those where such dressing was immediately applied, because glazing was only completed after many hours, and the comparatively immediate closure of the wound was premature in the great majority of cases. How this objection was overcome, and what it led to, will be considered farther on.

We next pass from the first stage of the process of repair to the second, extending up to the formation of pus and granulations. Given a perfectly glazed wound properly dressed, and primary union should be the inevitable result. Such a wound is inaccessible to extraneous matter likely to do harm. If properly cared for, the danger, if any, is intrinsic and depends upon the patient's general condition. Given, however, a wound that is bound to suppurate, I mean one that it is designed to allow to heal by granulation, and the second period becomes a field for speculation, and to this I shall recur.

The third and last period of the wound, the suppurative stage, is devoid of danger or risk, except from the effects of a mechanical or chemical character, such as blows, cuts, and corrosives. Granulation tissue, as previously indicated, consists of new blood-vessels and cells. Lymphatics it has none. Neither is it possessed of nerves. *It does not absorb.* That this is a fact has been long ago demonstrated in an experimental way by Billroth * and others. But experimentation is not at all necessary. The practice of surgery is full of demonstrations. A contused and lacerated wound loses part of its tissue by the interference with the local blood-supply, due to the injury done the blood-vessels in the immediate vicinity. The extent of the slough can not be ascertained until it is separating from the adjacent healthy living structures. These sloughs, despite their offensive character, view them any way we please, do not cause septicæmia and pyæmia. They are putrescent masses of animal matter, but do no harm except to delay union until they are thrown off. The same thing on a larger scale is seen in gangrene of the extremities and the spontaneous amputations that are the result. When these patients die it is not from excessive fever, but from the strain upon the nervous system and the drain upon their nutritive resources. Treat

* In his "Surgical Pathology."

these cases as you please locally, and the temperature remains above the normal, unless constitutional remedies are administered, or the excess of heat is carried off by artificial means, such as cold applications, as quickly, or even more rapidly, than it is formed.

The following may be considered a logical deduction from the facts thus far enumerated: *So long as there is any transudation from a wound there is no absorption by that wound.* It therefore follows that, as there is transudation of blood, plasma, and serum from the wound until glazing is completed, and as there is transudation from the wound of pus from the time granulations are formed until repair is completed, absorption does not, can not, occur during the first and third stages of repair. Of the intermediate stage more will be said below.

We all are aware that a number of patients under like environments and with similar injuries, together in one ward, will fare differently. The results will often be entirely out of all proportion to the kinds of traumatisms. A major amputation will survive with a clear history, while a minor injury or amputation in the adjoining bed will be the only source of worry in the ward to a house and visiting staff, until death puts an end to the suspense. Why is this? Both injuries may have been received under the same conditions—in fact, may be due to the same cause and have occurred in the same place; both patients may appear alike in every way appreciable to our senses; both may receive the same care by the same persons; both have similar requirements and are served alike; yet why does one perish and the other recover? This is not a question of infection, although some would have it so. Surgical practice, especially military surgery, is replete with instances when wards filled with injured of all kinds were swept by an epidemic, so to speak, of hospital gangrene; and how is it that a certain proportion of the injured in these same wards, sandwiched between the foulest cases, not only survived, but never had a bad symptom? This is not a question of infection. The prejudice against ligaturing veins became trite and was overcome by original men. To-day veins, the largest that are accessible, are tied. The prejudice against this practice feared pyæmia from such a procedure, because the resulting phlebitis would throw pus into the circulating blood, cause excessive fever, metastatic abscesses—pyæmia. It does not. This, also, is not a question of infection. When occasionally a patient with a ligated vein becomes pyæmic, it is not because the phlebitis caused an absorption of pus, but because the patient had not the ability to react against the injury and the oc-

currence of those symptoms that characterize the condition known as pyæmia. His resisting and reactionary powers were defective. Veins, large and small, are cut in all operations, and must heal by inflammation, whether they are tied or not. If the pus gets in a vein, and thence into the circulation, it will do so because the patient has not the resisting power to avert the pyogenic process. In other words, he is predisposed constitutionally.

This leads me to formulate another rule, which is that *most, if not all, of the so-called infectious disorders are due almost exclusively, if not exclusively, to intrinsic and not extrinsic causes.*

These intrinsic causes may be formulated under the general head of predisposition, and this may conveniently be divided into hereditary and acquired.

The hereditary form may appear at, or shortly after, birth as an anatomical defect, or may only show itself during infantile development. On the other hand, it may not exhibit itself till after the beginning of puberty. Warning may also be had of the existence of a defective tendency by some special subnormal physiological processes that are quite constant in, but peculiar to, the person affected.

The acquired predisposition may grow out of bad environments—as poor food, air, or light, exposure to cold or damp, or irregular mode of living; it may be due to intrinsic causes—as syphilis and other diseases, both local and general, or to bad practices or vicious habits. The degenerative period of life also furnishes abundant changes that go to make up a strong predisposition to diseases that had previously been ineffectual in encroaching upon the vitality of the organism. Every serious disease, like each grave operation—in fact, all serious disturbances—are potent in lessening the vitality or resisting power of the individual, or, in other words, they aid strongly in the acquirement of a predisposition to disease.*

* In view of the misunderstanding developed during the discussion of this paper, it seems not amiss to explain that by predisposition to surgical complications I do not mean predisposition to tuberculosis, or scrofulosis, inherited syphilis, or any of the well-known dyscrasiæ or cachexiæ, whether inherited or acquired; but a tendency irrespective of these to complicate traumatisms. Why do some women while in childbed, after a typical labor, and days afterward, without having had a bad symptom or any fever, develop a plugging of the femoral vein? Why do some women, without any apparent local or general trouble, develop the same condition? Allowing even the fallacious supposition to be true that the plug was derived from the uterine sinuses, where it was originally located as a clot, and we fail to explain why the clot, little enough to pass through the smaller uterine veins and those of the pampiniform plexus, should be arrested in a vessel of such

The views of Brehmer * are here worthy of consideration. After painstaking clinical observations and post-mortem studies, he concluded that it was the rule for those who died of phthisis to have been predisposed to it, that the predisposition was mainly due to anatomical causes, and that these causes could be mitigated or entirely eradicated. His views were announced to the profession of Germany, and received with incredulity and much adverse criticism. The opposition came from the most eminent. He challenged their right to denounce his views without a special experience equal to his own, and agreed to reopen the discussion on a proper basis with any competent person who would go to Vienna and make the studies that he had. He predicted that all who did so would find his facts correct, and, the facts once admitted, his own views were the logical deductions. He claimed, in brief, a certain normal relative size between the heart and lungs. In nearly all cases dead of phthisis he found the proportion between these organs widened. Either the heart was preternaturally small, or the lungs were abnormally large, or both conditions co-existed in the same individual. He reasoned that, when the proportion between these two organs became too wide, the heart was incompetent to properly supply the breathing apparatus with blood. If this did not show itself in childhood, it did at puberty, and was accompanied by palpitations, dyspnœa after very moderate exercise, loss of appetite, and, naturally, a disinclination for physical work. This caused a natural tendency to increase the trouble by promoting the avoidance of physical exertion, and compelling the growth of sedentary habits. Malnutrition of the lungs, due to an inefficient heart, were the anatomical factors that generally predisposed people to phthisis. Lungs whose mobility becomes restricted, either by pleuritic adhesions or by fixation of the chest-walls due to calcification of the costal cartilages, have a diminished blood-supply, and consequently lessened nutrition.

The observations of Koch,† and his deductions, almost completely

large dimensions as the femoral vein, instead of going farther down the limb, or, if hindered by valves and the blood-current, into the heart and lungs. There is probably a double cause, local (in the vein) and general.

* "Die Ætiologie der chronischen Lungenschwindsucht," Berlin, 1885.

† Appearing mainly in the "Deutsche medicinische Wochenschrift" and "Berliner klinische Wochenschrift" in the early eighties, besides some other journals and monographs. He even himself says that "und dennoch einige schwer oder gar nicht zu deutende Thatsachen da bleiben, welche uns zwingen, vorlaüfig die Annahme einer Disposition bestehen zu lassen." He consequently confesses that he is *compelled* to admit the weighty indications of the necessity for predisposition in the development of tuberculosis.

obscured these determinations of Brehmer, and even yet constitute a barrier to their being generally known. The claims of Brehmer, however, were in time acknowledged by the very men who at first so strenuously opposed them. Some of these gentlemen pursued the studies he had invited them to make at Vienna, and with the result of becoming converted to his views, as he had predicted they would.* The facts as he stated them could not be denied. His deductions were logical and correct. So far as I am aware, no man to-day, thoroughly qualified from personal experience to speak on the subject, upholds a contrary view.

Curiously enough, Koch himself has been the means of strengthening Brehmer's theory. Of the former, of a number of experiments on animals in which he made intra-thoracic injections of tubercle bacilli, some lived despite this treatment, and, upon being killed after many weeks, showed very circumscribed miliary tubercles at the seat of the former injections. The reasons for these exceptions were not satisfactorily inquired into, so that it can not positively be claimed that all those that escaped general infection had a superior pulmonary nutrition. The exception, however, can only be explained on the supposition that there was too much resisting power to permit the spread of the injected colony of bacilli; in other words, there was no predisposition. Given a patient so predisposed, and barring all accidental interferences, and he will die by his lungs. Given the same patient under good circumstances and in fair conditions, and tubercle bacilli will be impotent in their influence. Given the same patient again, but under disadvantageous circumstances, even in poor health, and the bacilli may be said to be potent for evil; but, whether there be any of these organisms or not, the lungs will fail anyway unless the sufferer's conditions are rapidly bettered. On these grounds it seems fair to say that the tubercle bacillus is not the dread microbe it is represented to be. †

* One of the most prominent of these converted opponents was Beneke, who, although he had mercilessly criticised Brehmer, and denounced his views as entirely too one-sided, after a sojourn of some time in Vienna, whither he had gone as Saul, says Brehmer, and returned as Paul, wrote a book entitled "Die anatomischen Grundlagen der Constitutions-Anomalien des Menschen." Herein he admits his former errors, and joins hands with Brehmer.

† Pütz ("On the Relation of Tuberculosis of Man to Tuberculosis of Animals," etc., 1883) relates a number of experiences that demonstrate the necessity of predisposition. On page 30 he mentions how he injected 12 c. c. of tuberculous matter, expressed from still warm tuberculous human lung, into the abdominal wall and cavity of a ten months' calf. Ten weeks after the injection, the animal, mean

In has now become the fashion to ascribe all deaths in surgical cases accompanied by fever as due to germs or micro-organisms. The majority of believers in this doctrine have no definite basis for their convictions. Having been taught to so view the matter, they adopt the opinion of their teachers, and seek to impart them to others by precept and example. That extreme antisepticism would never have reached its present status if all men were their own judges I have made it my business to prove. At the present day we smile, amused at the extremism of a few generations ago, when phlebotomy was so universal, and even now advanced thought based on better facts is forcing the so-called antisepticist to leave his self-constructed pedestal, or be consigned to the position of his recent sanguineous predecessors. It is very common to hear all ailments ascribed to the activity of "disease germs." Let the surgeon of the day, the one in fashion I mean, operate upon a patient and the end be fatal, and the only conception his mind seems capable of is that it was a case of "too much germs." If the patient gets well, it is because the germs were excluded from the wound by protective dressing. When, however, a skeptical brother comes along with a successful case in spite of germs, and with no preventive dressing, the cry is that God had helped the patient! It seems almost impossible for a man once wedded to this idea to ever divorce himself from it to impartially consider the question. Judging from the prompt acceptance and spread of antisepticism, without consideration by those adopting it, the cause would seem to be a special mental microbe.

The patient himself does not receive the proportion of attention

while not having had a single local or constitutional symptom, was killed, and showed a connective-tissue induration at the seat of injection. The peritoneal surfaces were perfectly normal in every way. Nowhere were there found any evidences of tubercles or tubercle bacilli, though they were zealously searched for. Four c. c. of the same fluid were injected directly into the substance of the right lung of a one-year-old foal on the same day. There was fever, with increased pulse-beat and respirations for about four weeks. A few days later the foal was killed, and scar tissue and tubercles found at the seat of injection and a little beyond. Yet not a vestige of tubercle bacilli could be anywhere discovered, even after the most diligent search. These are two sample cases. Others might be cited in which similar injections were followed by more or less formation of tubercles and tubercle bacilli; but the bacilli were found in large quantity mingled with micrococci or other bacteria, thus negativing Koch's assertion that the true bacillus tubercle was not found with micrococci, or showing that the bacilli found were not those of tuberculosis. However this may be, the conclusion either way would be more or less damaging to the views of Koch, and supportive of those of Brehmer.

he deserves. A patient at hand sufficiently diseased or injured to excuse surgical interference, is operated upon as soon as is convenient for the surgeon, and when all antiseptic preparations are completed. It is the rule to ignore the preparation of the sufferer for the coming strain upon his vitality.

The questions arise: What is antisepsis? Why is it used? What is its value? When and how should it be employed?

Antisepsis may be stated to be, *The prevention of contact between open tissues and living disease germs.**

The object of this antisepsis is to prevent this contact, on the supposition that it generally results in a more or less dangerous constitutional disturbance of the patient, and is quite often followed by fatal results. This operators accomplish, or seek to accomplish, by continuously spraying or douching the wound and cleansing of the neighboring parts and their own hands and implements with antiseptic solutions of various kinds, and an antiseptically hermetic sealing of the wound till union is effected.

If now we take any wound with coaptated walls, we expect to get primary union under certain conditions. These consist essentially of

a. Absence of all foreign matter.

b. Perfect coaptation of the surfaces.

c. The maintenance of perfect coaptation.

d. A certain degree of local tonicity; and,

e. A certain degree of general tonicity.

The first condition is the one upon which the antisepticists base their *theory.* They claim that various microscopic bodies are capable of insinuating themselves through the wounded surface and into the tissues, there to multiply and be spread broadcast all over the body, to breed those symptoms which are invariably produced by their presence if in sufficient number. To obviate this, they have discovered many substances that will poison or intoxicate these little bodies so as to make them harmless, and this, they claim, without damaging the patient. Dolly,† in his recent work, gives an account of over fifty varieties of microbes supposed to produce as many different diseases. His list is not greater, he informs us, because he did not want his book to assume larger proportions, and not because there were no more to add.

* The reader is urgently requested to bear in mind the *exact* meaning conveyed by the definition.

† "Technology of Bacteria Investigation," 1886.

If these little germs were the producers of certain diseases, these diseases should not exist in cases where perfect precautions had been taken to destroy them. The claim is that certain bacteria produce a fatal, or almost fatal, rise of temperature after surgical operations, and that such thermal elevations are never due to any other cause. Given, then, a large wound and perfect antisepticism, as regards spraying, douching, and subsequent dressing, with many layers of antiseptic gauze, and it is utterly impossible for the patient to get the symptoms supposed to be produced by the special pathogenic microbe. Should, however, such symptoms fully appear in defiance of perfect precautions, then the supposition that the disease is caused by microbes is demonstrated to be a fallacy.

A characteristic microbe has been found in diphtheritic membranes. Hence, microbists have concluded that this body is the cause of this disease. A certain solution of mercuric chloride was found to be sufficiently strong to destroy them. A woman in childbed had her vagina and cervix continually douched with this solution of ample germicidal strength, and in spite of this there formed in that vagina a typical diphtheritic membrane. This membrane was a perfect cast of the canal from which it came. Here is one negative experience with no chance for error, and it demonstrates conclusively that the characteristic microbe is not the causative element in the formation of this membrane or of this disease. In a question of this kind, one negative experience, if without error, is logically as effective a refutation of a theory as are thousands. *

The well-authenticated fact that some septic and other so-called infectious diseases diminish in proportion as higher altitudes are attained, and at the same time a proportionate decrease of germs is also observed, has led to the claim that the diminution in the frequency of the disease was due to the lesser amount of germs. It is, however, equally as rational—in fact, more so in our present state of

* This conclusion has been objected to because it was alleged the bichloride solution would coagulate the albuminous constituents on the surface of the vaginal mucus and protect the remainder underneath from any further action of the fluid. The same individual accounted for the success of the hot douche employed by Dr. Varick, of Jersey City, and others, by its power of killing germs. When confronted with the two statements, he explained that the hot water's action extended deeper than that of the bichloride. Now, the bichloride in a solution of 1 to 1,000 or 1 to 2,000 will make no appreciable difference in the albuminous constituents of vaginal mucus. Its effect in the vagina as regards the secretion is like water, *i. e.*, it dilutes and washes out the mucus, leaving the membrane freely exposed and rough to the touch. So that it *is* proved by the above-mentioned case and other similar ones that a diphtheritic membrane forms without the agency of germs.

knowledge—to assume that one and the same cause lessens both the disease and the microbes. They do not bear to each other the relation of cause and effect, but are rather both the effects of a third ætiological factor.

To enumerate the many failures of perfect antiseptic precautions in preventing so-called septic fever is not necessary. Very likely every man present has had personal experience of such failures. Many have been reported from all parts of the world where antiseptic surgery is practiced, and that too by the most ardent disciples of Lister. In fact, Lister has himself reported such failures, and at the International Congress that met in London he confessed that it was his conviction that patients under his care had been poisoned to death by the rigid application of his principles. When the impetus a new and striking idea receives is sufficient to cause the death of the ones committed to the care of those who support and apply these principles, it may be safely called an extremism—a dangerous extremism. It is this wholesale running away with men's minds that I would contend against this evening. Whoever has witnessed without bias an operation under rigid antisepticism, and has carefully observed the mental attitude of the principal surgeon and his assistant staff, could not help being impressed with the singleness of purpose and the narrowness of view of this same chief operator during the operation, although otherwise a man of superior mind. This warping of better minds is dangerous.

Having noted in a brief manner that perfect antisepticism frequently is ineffectual in preventing the conditions supposed to be produced by the germs that it is intended to cut off from entrance to the wound, it is proper to turn to that class of cases which make typical recoveries without any so-called antiseptic precautions. I will cite a few striking instances as examples.

Five puerperal cases of Dr. Josephine A. Dufré are instructive. The first, third, and fifth died with high temperature, and all the accompanying symptoms of septic infection, although every possible precaution was taken against sepsis, such as baths, change of cloths, and the non-attendance of contagious or infectious diseases. The second and fourth recovered with a clear history, although no precautions whatever had been taken to avert sepsis, and the doctor was even in daily attendance on a case of erysipelas. These facts go without comment.

Dr. E. H. Bartley informs me of the case of a pregnant woman, daily expecting the birth of an offspring, who was in constant attend-

ance upon one of her children very sick with scarlatinal diphtheria. In the midst of her nursing of this child she took to bed and was delivered by Dr. Bartley, who treated her and the scarlatinal child together without the mother developing a bad symptom, and this without any antiseptic prophylaxis. This case, too, goes without comment.

Another instance I would mention is one that occurred in the practice of Dr. W. J. Brandt. He was attending a case of malignant erysipelas, of whose malignancy there could have been no doubt, as the patient died. While handling and dressing the erysipelatous part, he was hastily summoned to a case of abortion, in which he delivered with the same hand that had been employed on the previous case; and although he had in his hurry forgotten to wash or even rinse his hands, the abortion patient recovered without a bad symptom. This case, also, goes without comment.

Dr. Charles Jewett's case of diphtheritic vaginal cast at the Long Island College Hospital has already been alluded to, and does not require reiteration or comment.

Our president, Dr. Benjamin F. Westbrook, who, during the first eight years of his practice, did a great deal of work as a practical pathologist and anatomist, and without taking anything like the present extraordinary precautions against infection, attended a large number of obstetric cases, and of all these does not recall a single instance of septic fever—so called. Since dropping his anatomical and pathological work for the purpose of giving all his attention to the heart and organs of respiration, he attended some more confinements, and from among this number he does recall several with marked hyperpyrexia. Comment is not required.

Dr. A. Warner Shepard, who for the last twenty years has *constantly* been making very many post-mortem examinations on all kinds of cases, and who *never* employed antiseptics in either his obstetrical or surgical practice, both of which have been very extensive, hardly recalls a failure of primary union or more than a slight reactionary fever, except, perhaps, when such results were epidemic and also occurred under antisepsis.

My former associate, Dr. H. T. Halleck, in a series of minor surgical operations, all without antisepsis, had uniformly successful results as regards the healing by primary union and the absence of fever.

In my own practice (hospital, dispensary, and private), in a period extending over four years and a half, every surgical case, with only

four or five exceptions, was so treated as to carefully avoid anything that might be construed as antiseptic. Yet in all these cases I have still to note my first failure to obtain primary union when it was attempted. The list comprises a number of injuries and operations, from a simple incised wound or amputated prepuce to an excision of the left upper jaw and part of the adjacent bones. I have purposely refrained from detailing any of my cases or tabulating the whole list, because these experiences are very common, and especially so among men who combine post-mortem work with operative surgery. It was the rule in my own cases to operate shortly after having made a post-mortem examination, or after the handling of anatomical material in various states of preservation. Soap and water was the only material employed to cleanse the hands, which, however, did not prevent the usual post-mortem aroma.*

I may here parenthetically remark that the cleansing of the hands from the odor from autopsies is more satisfactorily accomplished by constant rubbing and rinsing in a stream of running water alone than with the additional use of soap. This I suppose to be due to the adherence of the odor being due to its incorporation with the fat of the cadaver, and the difficulty of removing this when additional fat (soap) is added. The plain water seems to float the grease off the hand, and with it the odor. The cleansing is as complete as it can be when the hands feel rough whenever they are rubbed together.

In the service of Dr. Joel W. Hyde, at St. Mary's Female Hospital, it was the custom to give each obstetric patient one or more antiseptic vaginal injections per day after confinement. During this time it was the rule to have a higher and more lasting fever than could be

* Absorption must almost of necessity be as easy from a simple incised wound having, say, an extent of surface equal to one or two square inches, as one ten or twenty times as large. If germs cause fever, they should be practically as effective on a small surface as on a large one. They are capable of multiplying. The question is one of absorption and a struggle between cells and germs. Now, whether the surface be large or small, the proportion of germs active in a given area remains the same. The trouble at first is purely local between the germs and cells. If the cells can not overcome the germs, the latter are supposed to overcome the former, and it is only after winning in this local battle that the dread microbes can enter the system to spread havoc. This is the platform of the microbist. It is not irrational. It is the intermediate and conciliatory view. This all being accepted, the question of great interest is, Why should minor surgical cases and small wounds not give rise to septic trouble and refuse to heal promptly, as do a larger proportion of major cases? Germs do not explain it. The condition of the patient does. Major cases are more devitalizing, and diminish more the resisting power and leave less for local tonicity.

called reactionary. It was peremptorily ordered that all injections should be discontinued, and from that time until the present, while no kind of vaginal injection has been practiced, it has been exceptional to meet fever in the maternity wards. This experience extends over too long a time, and embraces too many cases, to be considered a coincidence. Dr. Bartley also has made the same observation in his private practice—fever with injections, and no fever without injections.*

Lawson Tait, formerly one of the most pronounced advocates of antisepticism, had his (up to that time) wonderful successes triumphantly pointed to as demonstrating the immense advantage of antiseptic surgery. Now, however, after having wholly discarded all antiseptic practices, he exceeds his former successes with an unbroken list of one hundred and twelve unselected cases of ovariotomy and oöphorectomy without a single death. He simply observes cleanliness during the operation besides developing the resisting power of the patient before the strain and maintaining it in the most careful manner afterward until recovery ensues. This is accomplished through the nervous, muscular, and vascular systems and the nutritive apparatus. So important does he consider the condition of the nervous system that the personal acceptability of the nurse to the patient shall be as complete and pleasant as possible. I have elsewhere already insisted upon the necessity of having the nurse acceptable to the patient.† Whatever contributes to the ease, comfort, and pleasure of the patient at the expense of what is hard, uncomfortable, and disagreeable, adds to the general tonicity, adds to the vitality, and increases the resisting power of the patient to an appreciable extent; and just in proportion as what may be called the operative period of the patient is pleasanter and healthier than the preceding period, just in the same proportion is that patient's chance of perfect recovery increased, provided that care has been taken in the proper preparation of the patient.

* I would in this connection call attention to a paper by Dr. Hiram Corson, of Pennsylvania, appearing in the "N. Y. Medical Journal" of May 15, 1886. Besides being written in a masterly manner, it contains the fifty years' experience of a venerable practitioner and writer in the treatment of over three thousand cases of labor without antiseptics. He does not recall an instance of puerperal fever, and did not have a single death. The seductive manner in which the paper is written, and its insinuating tone, will hold the attention to the end of any one who begins its perusal.

† "The Treatment of Scarlatina," Section II, "Archives of Pædiatrics," November, 1885.

As has already been stated, very little if any attention is given to the adequate preparation of a subject for operation. Granting that such preparation is made and is ample, it is often counterbalanced by comparative neglect after the operation. Hospital cases generally do not fare as well as those that are privately treated. The mortality in general hospitals is higher than in private practice for the same procedures. This is claimed to be largely if not altogether a question of infection, but it is not a question of infection. Note the difference in the general run of hospital and private cases. The great majority of the former are such as have poor and defective homes, and are lacking in means to maintain an existence in average health, in spite of hard and persevering labor, or else they have neither home nor means. Privation and suffering is the rule for a great many hospital cases. It is otherwise with those in private practice. The great preponderance of this class have sufficient means to pay for the attendance of the surgeon, the operation, the assistance of others, and for medicine, special diet, and experienced nursing. These people live better. They are better prepared to meet the strain. They receive the greatest attention from their visiting surgeon, who does not hurry with these patients, but hurriedly passes from bed to bed in the hospital wards, relying largely on the resident physician, upon whom the responsibility does not entirely belong, and where it is not assumed. Even resident physicians depend largely upon nurses, and they upon one another. I speak now of general hospitals. In special hospitals some things are better than in private practice, while others are not as good. But it is more expensive to get into a special hospital, as a rule, than it is to be treated at home. Only a few if any charity cases are admitted, and even here the distinction is maintained between the patient who pays and the one who does not.

Another point illustrative of the defects in hospital treatment as compared with that in private practice is, that nearly all are fed alike. Take one hundred surgical cases in a hospital. Give each the same kind and quantity of food. More especially is this so in military hospitals on or near the field. One out of this hundred has a stomach that will extract everything available out of the food presented. Another will prove the antithesis of the one just mentioned, and gastro-intestinal irritability, lack of nutrition, loss of strength, and of resisting power will result. Reaction becomes impossible. General and local tonicity, which may have existed at the beginning, gives way to flaccidity, anæmia, hyperpyrexia, pyogenesis, general disintegration,

and death. This is not a question of infection. Bad food is the fundamental causative factor in bringing about such a result.

The old saying, that "It never rains but it pours," is exemplified by this illustration, when we bear in mind that most general hospital fare, especially that given to no-pay patients, is not as good as that which even the poorer people provide for themselves. A young salesman or saleswoman from any of our stores, earning enough money to board in a house that is well furnished and provided with good table board, becomes ill or is injured and must be taken to the hospital, and, as their slender income is at an end, they are classed as charity patients. Their environments have suddenly, and at the worst possible time, undergone a notable retrogressive change. Will any one refuse to admit the potency of this change in its effect on recovery from any illness, injury, or operation? Add to the poorer environment a diet decidedly inferior, both as regards nutritive value, quantity, and palatability, and we have at once a very depressing factor added to what the patient is already battling against in its tendency to pull down the whole organism. Yet this is a factor that is either not at all considered, or passed over as of no consequence.

To return for a moment to the question of predisposition and immunity. I know a young physician who had never been vaccinated, who had never had variola, and who was exposed for periods of days at a time to a small-pox atmosphere because of his attendance on such cases in a small-pox hospital. He even then did not get this disease. His was a case of decided immunity from this affection. There are many more. Others escape the contagium because of vaccination. Many succumb to it in spite of vaccination. Some are even vaccinated at short intervals of a few months, almost always successfully, and not only become infected with variola, but die with it. These latter are cases of predisposition. Again, given a case of scarlatina, diphtheria, rubeola, or any other acknowledged contagious disease, and given ten people, all in apparently the same condition, who never had any sickness, and one will get the disease to which he has been exposed and die, another will get it and not die, still another will get it so as to be barely perceptible, and another will escape without the slightest disagreeable experience. The remainder will distribute themselves among those mentioned. Here we have once more an illustration of immunity and of predisposition. How much depends upon the contagium, so called, we have not always the means of judging. A strange fact in this connection is that physicians are, as a class, constantly being exposed to conta-

gious and infectious diseases, and without protection, not even always in fair health, and how comparatively few are the instances where any of them are affected! Surely, as a class, they can not be said to have a peculiar immunity *altogether* due to constant exposure, thus becoming accustomed to the poisons, for the exposure at the beginning is immediate and abundant, not gradual and slight. The fact is that contagium, as a rule, may be said to be of not much consequence without predisposition, and that predisposition without contagium is more to be feared as tending to the development of the disease to which the patient is predisposed than is the contagium without the predisposition.

The question now arises, What is the value of antisepticism?

When Lister introduced his dressing and gave his reasons, it was not long before he was rewarded with general credence of his views. He recalled the surgeons of the day to the care in handling and dressing wounds that had been in vogue with so much success not a great while before. He taught them to take care in operations; not to roughly handle wounded or injured tissues; to be slow and sure, rather than quick and uncertain. Scrupulous cleanliness; rest, both local and general, as nearly absolute as it could be attained; and the stimulation of the wounded tissues with solutions and other preparations having the avowed object of destroying or intercepting micro-organisms, which he believed to be the special pathogenic cause of the various symptoms often complicating or preventing recovery from operations and injuries, were enjoined.* He was right in treatment, and therefore successful. That Listerism has made accessible to the surgeon's knife almost any part of our bodies can not for an instant be denied. How it did so admits of two interpretations, if we choose to particularize. Surgeons operating by his methods were very successful. They were stimulated by these successes to new undertakings that previously no one dared attempt. The same kind of blind fanaticism, though milder in degree, that pervaded Europe during the Crusades, the Reformation, and the mental epidemics portrayed by Ecker, also dominated the surgeons of the whole world, and antiseptics were their charm that insured final success, as was the cross that of the Crusaders.†

* How hard it is for the bacteriologist to prove that the good effects of antiseptics are due to germ-killing properties may be seen from the fact that it is extremely difficult, if not impossible, to separate this germicidal property of antiseptics from their stimulating power, or to get a liquid that originally does not combine both.

† While the advance made by surgery during the last two decades or more is to

Lister gave the impetus that brought about these grand results, and for this merits, and has received, undying fame. The essentials of the methods he reinstated will probably, and with good cause, always prevail, but not so his theory of germs and their effects. The antiseptic rage has done incalculable good, but also a great deal of harm. Its advent was timely, else it would never have spread. Its practice with the idea of killing micro-organisms is on the wane. Its former advocates are undergoing a mental reversion. The reaction is approaching, and all should guard against its reaching the opposite extreme.

Now, what are the disadvantages of antisepticism?

The spray is abolished because its objections were too evident to long escape attention. The routine antiseptic vaginal douche is meeting a similar and equally deserved fate. Constant douching of a wound during an operation will also soon have to give way to a more rational and beneficial method. Pathologists and microscopists carefully preserve microscopical material from contact with

be almost wholly ascribed to Lister's innovation, it must not be inferred that success crowned every effort because of the new way. Surgeons were taught better practical surgery entirely aside from antisepsis, and to this better surgery will eventually be ascribed the success of the more recent operators, instead of to germicidal fluids and powders because of such properties. The favorable comparison between the results attained from the practical application of the new surgery, as compared with the old, led to the performance of untried operations; these succeeding, led on to others, until, like a rolling ball of snow, slightly broken records of success accumulated so as to form the enormous, bold, and complex surgery of to-day. The misinterpretation at the beginning, as to the real cause of the improved results, the bacterial theory, grew in the same, or even greater ratio. This sole idea of germs took possession of every unguarded professional mind, to which it has adhered, and where it has developed to the stupendous proportions of to-day. The investigations of certain bacteriologists—as, for instance, Pasteur and Klebs and Koch of Europe, and Salmon of this country—while justifying many inferences and establishing many minor and very few major facts, are largely the cause of the present exaggerated estimation of the germ theory in its application to surgery. The men who least understand the value of the facts and seeming facts now established in this field of research, are the ones who overburden the literature on the subject, and compel a forced postponement of a mature judgment on the results of original work in this department. Unfortunately, very few surgeons are pathologists of the practical kind, and *vice versa*. The same may be said with as much truth of surgeons being bacteriologists, and the contrary. But how seldom, if ever, do we see combined in one man the practical pathologist, the surgeon, and the bacteriologist? Sad, but too true, is the fact that in most instances each man has to theorize in two of these departments while he practices the other. This is one of those instances where science would be greatly benefited by the adoption of the co-operative plan.

water, because of its disorganizing effect upon the tissues. It ruins them for microscopical investigation. The effect of water is observed on the fingers if long immersed, giving rise to the so-called washer-woman's finger. It loses tonicity. It debilitates and enervates. The hot-water immersion treatment of wounds does good by toning down the excessive inflammatory process; so do all hot moist applications, as poultices for instance, but, if too long continued, they give rise to a sodden condition of the wound, and make matters worse instead of better. Carbolic-acid solutions have the same effect, but in a shorter time, also benumbing the terminal nerve-filaments in the wound and the surgeon's fingers, whose tactile sensibility it is of prime importance to preserve at its best. More laparotomy cases have, in all probability, died of carbolic-acid peritonitis than any of us suppose or would like to admit. I would in this connection formulate another rule—one that requires no further comment.

A local traumatic peritonitis has no tendency to spread unless it is preceded by the extension of some irritant matter from the original site of inflammation, and then the inflammatory process will follow this cause and only become general if preceded by it.

Lister's dressing and its derivatives prevent the inspection of the wound at will, and therefore are objectionable, because the surgeon should be able to inspect the wounded parts readily, and without disturbing the patient. A wound hermetically sealed, especially before glazing is completed, is objectionable in that it may give rise to bad symptoms in a feeble patient, and be followed by disastrous results, because of pent-up secretions. It is also objectionable because of the impossibility of an early detection of recurring or secondary hæmorrhage. These objections have a practical side, and the dangers expressed have repeatedly happened. All the objections to antisepticism contained in this paper have been demonstrated more than once in this city. So much is this so that it is useless to specify cases.

In brief, the principal points that it is the object of this paper to impress are as follows:

1. There are essentially but two kinds of union—primary and secondary.

2. All living tissues have common and special powers of reaction.

3. The common reactions are those of mere vitality, and the special reactions are the result of the performance of duties not necessary to life.

4. It is by their common reaction that cells overcome disturbances.

5. Repair in all structures is essentially the same, and only the manifestations are different.

6. Connection and support is the special duty of the connective-tissue cell, and it is its sole and special duty to repair all breaches of continuity, and it does this without the aid of other cells.

7. Of all structures involved in the inflammatory process, the lower tissues, embraced by the term connective-tissue group, undergo additional growth and development, while the higher tissues, embracing all that do not belong to the preceding group, become atrophied or are destroyed.

8. The repair of an open wound may be divided into three stages, extending in regular order up to the glazing of the surface, the formation of granulations and pus, and the end of repair.

9. There is transudation of blood, plasma, and serum, until glazing is complete, and of pus from the time granulations are formed until the end of repair.

10. There is no transudation from the wound from the time glazing is completed till granulations and pus are formed, but the wound's surface is protected with a coagulated albuminous layer.

11. So long as there is transudation from a wound there is no danger of absorption by that wound.

12. The possibility of absorption during the intermediate state just mentioned may be called an open question.

13. I do not believe absorption takes place, as a rule, even at this stage, if the albuminous envelope, the glazing, is perfect.

14. This intermediate stage lasts three or four days.

15. Admitting that absorption is possible at this time, and that antiseptics should be employed, they would only be indicated for three or four days.

16. Sealed dressings to remain so for weeks are not required for antiseptic purposes, and do good almost entirely by insuring greater rest to the injured part.

17. I believe that primary union is prevented principally by local and constitutional causes, and not alone by pathogenic micro-organisms.

18. Anæsthesia retards glazing, and indirectly prevents primary union because of the premature coaptation of the surfaces of the wound.

19. A local traumatic peritonitis has no tendency to spread un-

less it is preceded by the extension of some irritant matter from the original site of inflammation, and then the inflammatory process will follow this cause, and only become general if preceded by it.

20. Surgical infection is a term too carelessly employed, and in most instances a misnomer.

21. Most often the symptoms ascribed to surgical infection are due to reactions of the whole system and of the wound against new conditions and irritations.

22. These reactions depend upon the predisposition of the patient, altered environment, and other defective conditions of life, for their characteristic manifestations.

23. The causes of most so-called infectious disorders are intrinsic and not extrinsic.

24. The absence of predisposition may here be said to constitute immunity.

25. Predisposition may be hereditary or acquired.

26. It may be gradually or quickly acquired.

27. It is not always evident, nor always possible of detection.

28. Hyperpyrexia is as normal in some pathological conditions as is the standard in health.

29. Excessive reaction is followed by temperature elevation.

30. Various affections have thermic elevations peculiar and normal to themselves.

31. If germs have any causative relation to surgical complications, they are impotent on a wound's surface unless the patient is predisposed.

32. Hyperpyrexia is produced by long-continued excessive action of any organ of the body or part of the body.

33. Local irritations, if long continued, if sufficiently strong, or if affecting a sufficiently sensitive structure, also cause a rise of body heat, and this whether or not the irritation is appreciated by the mind, although its recognition by the brain increases the effect.

34. Those tissues which have the richest nerve-supply and densest consistence, as a rule, give rise to the most marked constitutional disturbances when congested or inflamed.

35. The more perfect, absolute, and continuous the rest of an injured part, the more favorable are the conditions of repair, and the greater certainty is there of complete, rapid, and satisfactory recovery.

36. Conjoined with this, the most nourishing and most easily

assimilable food, sustaining medication, with good hygiene and agreeable environments, constitute the best treatment of surgical cases.

37. Antisepsis is the prevention of contact between open tissues and living disease germs.

38. In a question of this kind, one negative experience, if without error, is logically as effective a refutation of a theory as are thousands.

39. One such negative experience has occurred in our midst in Dr. Jewett's case of diphtheritic cast of the vagina, and this is by no means a lone instance, as there are many others equally as conclusive.

40. Antisepticism, as above defined, is demonstrated to be a fallacy, and therefore can have no rational existence.

41. As good results are obtained by careful surgeons who do not employ antiseptics as are obtained by those who do.

42. I deny the causative relation of most so-called pathogenic microbes, because they are the results or concomitants, and not the cause, of the diseases with which they are identified.

43. Lawson Tait, without the use of antiseptics, has exceeded all preceding records of success.

44. The greater success in the treatment of private patients, or patients in special hospitals over those in general hospitals, is not due to superior antiseptic facilities, but principally to greater attention on the part of the surgeon, healthier and pleasanter environments, and a superior and constantly appropriate diet.

45. Practical antisepticism, or Listerism, has its advantages and its di advantages.

46. It does good by having revived and improved upon well recognized and highly valued older methods.

47. It has unconsciously furnished a means of overcoming the local tonicity of wounds, and it did so at a most opportune time.

48. This is accomplished by the stimulating effect upon the tissues of the so-called antiseptic preparations in moderate strength and for a limited time.

49. It has done good by instigating daring surgery, and leading to the achievement of the most brilliant, undreamed-of, and hoped-for results.

50. It is seductive, and causes men to adopt and follow it who would be neither clean, gentle, nor careful without it.

51. Listerism may be designated a "God-send" to patients who

have to put themselves under the surgical care of a large proportion of our fellow-practitioners, both in the city and country.

52. This is so because it controls them as religion controls the masses.

53. It has done harm by instituting new and pernicious methods, often at the expense of those that were older and beneficial.

54. It has poisoned many patients.

55. It has killed many other patients by increasing inflammatory action, especially of the peritonæum.

56. Its almost indiscriminate advocacy of sealed dressings is, and has in innumerable instances proved to be, a source of interference with proper healing, and even an element of danger in preventing the early detection of deviations from the normal process of repair.

57. It also delays the recognition of recurring and secondary hæmorrhage.

58. Its good is done under a cloak of irrationality, because its good effects are claimed to be due to the killing or inhibition of germs, whereas its benefits are wholly and unqualifiedly due to the rigid enforcement of the best surgical principles, fully recognized before the advent of the fallacy of antisepticism.

Dr. George R. Fowler began the discussion of the paper, and his remarks were subsequently written out in the following form: I fail to see that this arraignment of the antiseptic treatment of wounds by Dr. Leuf has brought any new facts to the surface. The arguments advanced are the same that have been brought forward by the opponents of the antiseptic system since the first introduction of the latter. In the first place, the statement that there are but two methods of wound repair—the first being by primary adhesion and the second by suppuration—is not borne out by the experience of those who practice either of the antiseptic systems or methods. Such a statement ignores entirely the healing by granulation without suppuration under an antiseptic dressing; the organization of a clot, which may fill up a bone cavity for instance, and which likewise occurs without suppuration; and, lastly, sponge grafting. The two last certainly can not be accomplished without the most rigid antisepsis.

Let us glance for a moment at the physiology of repair: First there occurs swelling of the parts, to a greater or less extent, from capillary turgescence. From the dilated capillaries plasma exudes, which infiltrates the adjacent tissues, and, when occurring upon the cut surfaces, constitutes wound secretions. This exudation of plasma

is proportionate to the amount of the local irritation, and within certain limits is essential to the needs of the reparative process, and can generally be kept within due bounds by properly protecting the wound from further irritation, and by rest and compression. If the irritation is but temporary, the increased activity in the capillaries, or active hyperæmia, soon subsides; but if the irritation continues or increases, tissue changes occur; these consist in exudation and cell-granulation. These latter always occur where the injury inflicted is sufficient to produce a solution of continuity, and are the essential agents in the reparative process, or building up of new tissue to fill up the breach. Now, anything which produces excessive irritation or prolongs the latter, leads to excessive exudation and cell-germination, and it is the over-production of these cells (the embryonic cells of Stricker), washed away from the surfaces of the wound by the excessive exudation, which constitutes suppuration. Probably such a thing as absolute primary adhesion never occurs; however closely the wound surfaces are approximated, a delicate layer of new tissue intervenes and constitutes the bond of union.

I will not undertake to enumerate the many causes of failure of union, but there can be no question that this failure may be due to very many and diverse causes. Not the least among these, in my opinion, is that which antiseptic surgeons recognize as infection by poisonous agents, and particularly by organic matter floating in the atmosphere. I presume there can be no doubt as to the existence of this organic matter in the atmospheric air, for this has been abundantly proved by Tyndall. That this largely consists of microscopic germs capable of setting up putrefactive changes in organic fluids is also capable of demonstration, and has been proved time and again. And that their effects are such as produce evil consequences has been shown by Panum, Billroth, Bergmann, Klebs, Pasteur, Koch, Loeffler, and Ogston. The presence of these germs growing in the tissues acts as a source of irritation, just as the presence of foreign substances of a macroscopic nature, such as gravel, sand, or filth of any sort, is known to. This irritation results in increased hyperæmia or afflux, excessive exudation of plasma, over-production of embryonic cells, which latter, failing to become fixed, are thrown off in the liquid plasma, and, as before stated, constitute pus; this in reality is a waste of reparative material. Inflammation may also result from this prolonged irritation, and consists in a stasis in the capillaries, an extension of the area of active hyperæmia, a slowing of the current of blood, particularly at the points nearest the irritation, where it

may become arrested altogether. The white corpuscles, or leucocytes, are crowded against the walls of the capillaries, finally penetrating these, and choke up the circumvascular spaces. Exudation of liquor sanguinis, blocking of the vessels with red blood-corpuscles, and, as a result, the occurrence of redness, pain, heat, and swelling, constituting the classical picture of inflammation, now take place. All this may be directly traceable to the existence of excessive irritation, and this may as certainly be due to the presence of germs deposited in the wound as to the existence of foreign matters appreciable to the naked eye, too great tension upon sutures, insufficient drainage, or allowing "dead spaces" for the accumulation of wound secretions. To be sure, all wounds that are not treated antiseptically do not do badly, for speedy closure and direct contact of the surfaces allow but a relatively small amount of air and its contained organic matter, including germs, to find a lodgment. What few gain access are brought in direct contact with living cells which, possessing certain powers of resistance to the action of pathogenic germs, prevent their development and finally destroy them. That this occurs is an established fact, and that germs do harm in the manner I have pointed out has been equally well proved.

Professor Hamilton, in the paper alluded to by Dr. Leuf, and which appeared in the New York "Medical Record" for January 2d of this year, although pretending, and at first glance appearing, to be perfectly fair toward Lister, certainly can not be said to be just in his condemnation of that surgeon's theory of wound infection and its consequences, inasmuch as, without doing aught else than to call attention to the other causes for failure of primary union, he proceeds to emphasize his own disbelief in the evil effects of these noxious agents by declaring that "the various manipulations and devices for the purpose of excluding the germs . . . serve no other purpose than do the walking, talking, and gestures of the prestidigitator." And this without attempting to deny that germs do exist in the atmospheric air, or to contradict the accuracy of the results following the elaborate experiments of the investigators to whom I have already alluded. In fact, in a preceding paragraph he admits the value of antiseptics in preventing the decomposition of blood, pus, and serum.

I fail to appreciate the argument set forth by Dr. Leuf that, when primary union fails, the fault lies not with the absence of antisepsis, but with the predisposition of the patient—an inherent something which forms an insuperable barrier to rapid repair.

While I am willing to admit that the existence of a well-marked dyscrasia may lead to failure of repair, just as it may lead to failure of union in a fracture, yet, if this were true to the extent stated, wounds occurring in patients afflicted with syphilis, tuberculosis, and struma might be expected to break down and suppurate almost constantly, even under antiseptic treatment. That this is not true, my own experience, as well as that of my colleagues who follow antiseptic rules in operating, clearly shows. In 1884 I visited the wards of Professor Esmarch, in Kiel, and was shown more than thirty cases of excision of the knee joint done in a rigidly antiseptic manner and without drainage. These excisions were done for destructive disease of the knee-joint, and, as one can readily believe, occurred for the most part in broken-down persons, the subjects of struma. Here certainly the treatment was handicapped to the fullest extent by the existence of a well-marked "predisposition," and yet these patients were all doing well, and primary union of the soft parts, with complete consolidation of the bony structures, was the rule, and that ordinarily under but one dressing. Volkmann, of Halle, declared to me that, so great was his faith in the antiseptic system, he believed wounds should heal without suppuration or other accident, no matter what the patient's general condition might happen to be.

It is not pretended, as stated by the essayist of the evening, that general infection is caused by the direct entrance of bacteria into the general system, although the researches of Ogston would tend to prove that micrococcus poisoning is the chief factor in the production of septicæmia and septopyæmia. The absorption of the products of decomposition from the pabulum upon which germs feed and in which they grow—in other words, the ptomaines almost invariably present in putrescent animal fluids—is, when they are absorbed in considerable quantities, sufficient to account for all the symptoms. It may be a question of bacteria poisoning, micrococcus poisoning, or ptomaine poisoning.

The subject is a vast one, and but scant justice can be done it in such a discussion as this. There are a few more points, however, to which I would beg to refer. The experience of Mr. Tait has often been alluded to. I doubt if that noted and brilliant surgeon was ever a very enthusiastic antiseptist. He tried the method very faithfully, I have no doubt, for I know him to be a painstaking and conscientious surgeon. He "tried his tea-kettle, and gave it away," thereafter getting equally good, if not better, results. But the field of surgery which he particularly cultivates and for which he has

done so much is not the one in which great gain has been hoped for, even by Lister himself. The peritonæum does not seem to have that greediness, so to speak, for germs and their products evinced by other tissues, and, in fact, has recently been proved to be a much more tolerant and tractable membrane to deal with than was formerly supposed. It is in compound fractures, large incised wounds, and injuries of that class, that the differences between the old and the antiseptic treatment are the most marked. I happened to enter the profession at a time when all the great advances in surgery of this century, except the antiseptic treatment of wounds, were yet fresh in the minds of, and fully elaborated upon in the lecture-room by, the masters of the art. With all these fully impressed upon me, I strove to get the best possible attainable results. The results of the best of these earlier efforts, I assure you, can not at all compare with what is to me now an every-day experience.

I am not an advocate of the typical Lister dressing. I believe it to be cumbrous, expensive, and open to other objections as well. I believe in the application of a dressing which will allow of the free entrance of air, and thus favor the rapid desiccation of the discharges. The moss dressing of the Germans or the paper-wool dressing introduced by myself fulfills all the requirements of dry wound dressing perfectly. Of course, this is only to be applied after all so-called "dead spaces" have been provided against by drainage or suturing, and the wound has been sterilized and closed. But that Lister's or any other dressing of an antiseptic nature prevents us from knowing what is going on in the wound, is a fallacy. Baron Larrey, the elder, the great master of French surgery, as well as the equally clear-headed and successful English teacher of our art, Sir Astley Cooper, in their day declared against meddlesome surgery; and the reasons given for this are as cogent now as then. Failure of drainage, sepsis, and other untoward conditions, are quickly announced by the thermometer or by the occurrence of pain. The time occupied and material used in an antiseptic dressing are trivial matters compared to the absence of necessity of frequent changes, to say nothing of the surgeon's peace of mind when he feels the assurance that all will go well with the wound as well as the patient, and that if failure occur it is through no fault or neglect of his own. The requisites in these days of simplicity in dressing are few and inexpensive. Mercuric bichloride, or even common salt, or diluted vinegar, if nothing better is at hand, is easily obtainable, and sawdust, or absorbent paper torn into narrow strips and made into a

cushion, constituting the before-mentioned paper-wool, is all that is really needful, in addition to what good surgery always requires, namely, cleanliness and proper measures for closing the wound and draining it; or, these not being deemed needful in the particular case under notice, support and compression.

The charge that those who practice antisepsis do not pay proper attention to the preparation of their patients, or become so absorbed in the antiseptic idea as to be oblivious to everything else in and about the operation, requires no refutation at my hands. So far as my observation goes of the gentlemen so accused, this argument against antiseptic treatment is based upon a purely gratuitous assumption.

I regret my inability, without encroaching unwarrantably upon the time of the society or the privileges of those who are to speak after me, to go over the ground covered by Dr. Leuf's paper more thoroughly. I have endeavored to state my own convictions and the grounds for them, and to declare to you that, in the light of the researches of experimenters in the field of bacteriological science, and the experience of those who, acting upon the suggestive results derived from these experiments, treat wounds antiseptically, in my opinion the surgeon who does not take into account every possible source of danger that may overtake his patient, including in this the noxious influences arising from the entrance of germs into the tissues, is criminally negligent, and directly responsible, both to his own conscience and to the world at large.

Dr. Frank W. Rockwell said that he regretted very much that he was compelled to discuss so voluminous a paper without a better preparation than that of merely listening to it. There were many points made by the writer with which he agreed, and points which he conceded—all of which went to show that wounds under apparently adverse conditions would do well, and that recoveries would ensue upon almost any form of rational or even irrational treatment. The possibility of such recoveries all would admit, but that was not the point at issue. To his mind, as a practical surgeon, the question was not whether such recoveries were possible, but whether, as a rule, patients did better, recovered more rapidly, with less risk to life or limb and anxiety to the surgeon, with antiseptic treatment than under other forms of dressing. To this question he thought there could be but one answer, and that an affirmative one. By "antiseptic dressing" he did not necessarily include all the paraphernalia now considered essential to rigid antisepsis. The spray had been done away with, and he believed that, with the exception of rare cases, the drainage-tube and irrigation would follow, and that in the

near future the aim of the surgeon would be to *leave* a wound aseptic, cover it with a thoroughly sterilized and preventive dressing, and leave nature to do the rest of the work of healing under infrequent dressing. As for himself, he only used irrigation just before closing large wounds, being careful that all surrounding parts were rendered aseptic before and during operative procedures. A comparison of the results attained since antiseptics had come into general use with those of former days would certainly answer the question which he had asked. The published statistics of Volkmann, Neuber, Nussbaum, and Esmarch, and the tables of Dr. Schede, of Berlin, would certainly be sufficient basis for comparison, even if the testimony of almost all surgeons in large hospital experience were not given to the same end. To be sure, there were a few men who professed to ignore antiseptic methods; but even these few, as judged by their published writings and teaching, had adopted some modified form of antiseptic treatment, so that to-day the surgical world was largely influenced by the method against which the paper of the evening was addressed. An experiment had just been made by the speaker which would illustrate the difference between the two methods in a fair light. On taking charge of the service at St. John's Hospital the month previous he had found in the children's ward several cases of chronic disease of bone, varying in severity from a recent resection of the head of the femur to a general strumous osteitis of the lower end of the tibia. Among these cases was one of spinal caries. They had been treated by simple daily applications to discharging surfaces, and general support, etc. This group of patients had, according to their temperature charts, been showing in every case a daily record varying, on an average, from 100° to 103·5° Fahr. No change was made in the medical treatment or the surroundings of these children, but each one was submitted to a thorough disinfection of the discharging surfaces with mercuric bichloride, all sinuses were curetted and irrigated, and a dressing of iodoform applied, over which a paper absorbent, containing the bichloride (1 to 2,000), was bandaged with sterilized gauze. In all but one instance the temperature fell to the normal (or *nearly* so) at once, and so remained; and, after one or two repetitions, the dressings were only made at intervals of a week or ten days, so marked was the diminution in the discharge, and in every case marked improvement had resulted in the color, weight, and strength of the patients, to say nothing of the saving of time and trouble to the house surgeon and expense to the hospital. The exception noted occurred in the case of a little girl who was suffering from pulmonary phthisis, as well as a tubercular osteitis of the tibia, and who, of course, showed the characteristic diurnal temperatures of her pulmonary trouble. (The thermographs of some of these cases were shown.) Now, when one can obtain such marked results as this, not only in chronic suppurating wounds (which are notoriously unfavorable for antiseptic or any other treatment), but can feel confident that, in all acute cases, serious operations can be undertaken with a rational belief that, in the vast majority of such cases,

prompt and successful results will be obtained by the adoption of a few simple precautions, it would seem worse than useless to argue for the adoption of such measures, especially when, in all the great operations of surgery, so far as the successful treatment of the wound was concerned, a favorable termination was the rule, and not, as in former days, a happy exception.

Dr. ELIAS H. BARTLEY said that he was not a surgeon, and must leave the surgeons to discuss this subject from their own standpoint.

In the practice of obstetrics, however, he was sure that his results had been better since he discontinued the use of antiseptic injections. Proper care as to cleanliness was all that he insisted upon at the present time, and he was satisfied with it. The author of the paper had referred to a case that the speaker had recently attended. It occurred in a tenement-house, where the family had but two available adjoining rooms. A child of about two years of age was suffering with a severe post-scarlatinal diphtheria of the pharynx, mouth, and post-nasal regions. At the height of the disease, and while the mother was nursing this child, with the assistance of a neighbor living in the same house, she was confined. He found her attending to the wants of the sick child in the interval between her pains. His only assistant was the woman who had been assisting in the care of the sick child, whom he requested to change her dress and wash her hands and arms to the elbows. No other antiseptic precautions were taken except the washing of his own hands with soap and water. This was certainly a severe test, as the sick child was in an adjoining room, suffering with a severe and fatal diphtheria during the desquamative period of scarlatina. The mother was washed externally with clean water twice daily, made a normal recovery, and on the eighth day was found out in the room with the sick child again. There was no infection of the lochia, and no rise of temperature.

One of the worst cases of puerperal septicæmia he had ever had occurred in a woman with whom he was using bromo-chloralum very freely as a vaginal douche. On the other hand, he might mention a case where disinfection seemed to do good.

In the Sheltering Arms Nursery he had tried the effect of systematically disinfecting the wards and discharges of the children with chlorine in the form of chloride of lime. Either this or some other unknown cause had certainly lessened the number of cases of intestinal disorders among the babies during the last summer. It was remarked by the matron and by the physicians in charge.

Dr. C. N. D. JONES congratulated Dr. Leuf on the beautiful *résumé* which he had given of the surgical pathology of several years ago, but he had certainly not referred to the surgery of the present day.

Antiseptic surgery was now an accepted fact. Our methods of wound treatment might not be perfect, but the principles of Listerism were almost universally recognized, and the question now was, What was the best method of putting these principles into practice? Not every surgeon

could fulfill systematically and accurately all the requirements of the antiseptic method, but this was the fault of the individual, and not of the system.

The use of an antiseptic did not constitute antiseptic surgery. To successfully apply this method not only required a great amount of practice, but demanded a certain intellectual intuition, which foresaw the danger that any omission or mistake would incur. Statistical evidence, showing the marvelous improvements with the new method, was too numerous and convincing to be lightly ignored. Operations that a few years ago were dreaded and avoided were now done without danger or complication.

He disagreed with many of the statements made by the author of the paper, but could only refer to a few of them at that time. He had frequently observed the healing of a healthy open wound without the formation of pus.

Schenerlein had recently demonstrated that the presence of micro-organisms was always necessary for the formation of pus. If a wound was properly protected, the surgeon might with almost absolute certainty prevent suppuration. A wound was thus placed in the same condition as a subcutaneous one.

He did not believe that glazing of the cut surface was necessary in order to obtain primary union. If perfect hæmostasis was secured, the drainage-tube might be dispensed with and primary union obtained. Drains were a safety-valve for imperfections and mistakes in the operation. If one did not feel sure of his antiseptic precautions, drainage should be employed. In illustration of these facts he cited the details of a case lately under his care. The patient fell so that her arm caught on a broken key projecting from a door, causing a perforating wound of the elbow joint. She received no special treatment for nearly a week. When seen, the joint and whole arm were enormously swollen and tender; cellulitis extended nearly to the shoulder. Pulse, 120; temperature, 104° F. The joint was widely opened, drained, and placed under the antiseptic irrigator for seven days. At the end of that time the wounds were thoroughly cleaned and the arm put up in a permanent dressing. When the dressings were removed, a wound 4 inches in length was found to be nearly closed, and without the formation of pus. The patient recovered with a perfectly useful joint.

A third way in which wounds healed was by the organization of the blood-clot. He had recently had six consecutive osteotomies heal without the formation of a drop of pus, and had no doubt that union had occurred in this way. If there was one operation that could be done successfully, with perfect cleanliness, and without the aid of antiseptics, it was laparotomy. The success of Mr. Tait in this branch of surgery was phenomenal. It was claimed by some that his method met all the requirements of antiseptic surgery. Why did he so carefully cleanse his sponges? Why did he make such a small opening, and lay such stress on the short time that the abdomen should be exposed? Why was he so careful in

the cleanliness of all his surroundings, if he did not fear the effects of an unseen foe? Yet when Mr. Tait went out of the field of laparotomy he met with suppuration and septicæmia. The speaker had watched twelve consecutive cases of laparotomy recover under antiseptic treatment, and he was not disposed at this time to forego the use of antiseptics. In regard to antiseptic midwifery he would remind the author of the paper that too much reliance could not be placed in the corrective effect of the vaginal douche when the fundamental principles, aseptic surroundings, clean hands, and protected instruments had been disregarded. In conclusion, he would ask Dr. Leuf if he would have his own knee resected without antiseptic precautions? If he at this time had no faith in antiseptic methods, then, with Dr. H. B. Sands, the speaker was surprised at his incredulity.

Dr. Leuf concluded the discussion by saying that while it might be true to say that he had added no new facts, it was nevertheless true that he had collected together and sought to strengthen old, and perhaps some new, but forgotten and neglected, facts. He was not the first one to arrange methods of union into two classes, and yet he would only specify two in the way he did in spite of so-called union of open wounds without suppuration, because very much depended on what we agreed to call suppuration and where the line was drawn between it and non-suppuration. If time permitted, he would ask nothing easier than to prove the soundness of the view that there were essentially but two kinds of union. The organization of a blood-clot in bone, or any other place, and healing by sponge grafts, also properly belonged to one of the two kinds, and did not form a third method essentially different from the main two. Dr. Fowler seemed to think diapedesis a necessary factor to constitute the inflammatory process. There was nothing like unanimity on this point among histo-pathologists. He believed it to be an indifferent and uncertain accompaniment of the inflammatory process, but not a necessary factor. Dr. Fowler was really inconsistent in one connection. It was with reference to the statement that care should always be taken to use the most thorough antiseptic precautions for the purpose of killing or inhibiting all germs, if one would not be guilty of "criminal" negligence; and another statement to the effect that so many non-antiseptic operations do well because they are rapidly performed and the wounds quickly closed. Quick closure of the wound just happens to be the antithesis of the non-antiseptic way of closure. It is very often exposed for a long time. Then how does that statement explain the freedom of cases, treated on the open plan, from excessive fever—"septic fever"? He would mention only Billroth in Europe and James R. Wood in our country as examples. In the open treatment of wounds they achieved better success than in those that were carefully protected from the air and its germinal constituents. Billroth even said that his compound fractures did remarkably well, as compared with all other methods, when he had free drainage from the broken ends of the bone to the outer

air. We also knew that if a joint was opened by a free incision, admitting of the easy entrance and exit of air and fluid, it was in the main safer than making an opening through which air and fluid might enter and not readily escape. On the question of predisposition, the doctor had been entirely mistaken as to the meaning of the term as used in the paper. It had been especially stated that this predisposition to surgical complications could not yet be defined. Many persons, with either a syphilitic, tuberculous, or even scrofulous diathesis, did not have the predisposition which the paper was intended to clearly separate from these dyscrasiæ. It was exceptional to be able to *positively* state of any individual seen for the first time and with no surgical history, how a wound would behave; just as difficult as it often was to detect a hæmorrhagic diathesis without a demonstration. The claim made by Dr. Fowler, and now by nearly all holding similar views on this question concerning the uselessness of antiseptics in laparotomies, was a confession that could easily be made to cost them dear. If time only permitted, it could be shown to be an entering wedge that would promise to soon rend asunder the whole antiseptic fabric. The extremism of those on the opposite side of this question was evidenced by the haste with which they consider all who are not with them as criminals, and yet they are only working upon a *hypothesis.*

Concerning Dr. Rockwell's cases, he would only take time to say that the doctor appeared satisfied with the explanation he had offered in accounting for the improvement in his cases. Now, it was well to bear in mind that the bichloride of mercury was used to wash the wounds; they were curetted, they were irrigated, and they had iodoform applied to them. Here was enough stimulation, if not irritation, to encourage a healthy healing process, the same as cauterization would have done. Additional stimulation was continued with the iodoform, and yet these results were all claimed for antisepsis—the killing of germs! The healing of an indolent ulcer after cauterization may also be claimed by antisepticists to be due to the killing of germs; that is their privilege, but they can hardly expect every one to take the same one-sided view.

The statement by Dr. Jones that antiseptic surgery was an "accepted" fact was really wide of the mark, as it was decidedly not accepted by a great many. Nor are the principles of Listerism "universally recognized." He could hardly believe that a mind could be so biased as to think that pus was invariably due to the influence of germs. Now, could any one tell where the germs came from that are found in pus contained in either normal or abnormal closed cavities? Then how about the pus that could be taken from the bottom of a thick layer, fresh from the granulating surface, without the appearance of germs? This made it seem as though the pus caused the germs. Pus-germs don't get through a man's hide and backbone to begin a vertebral caries and a psoas abscess, and yet they may be found there in large number and in considerable variety. They were pus-born.

Many unhealthy sores of nervous origin could not be accused of being caused by germ action, but perhaps it might be claimed that germs had attacked the nerve-centers; but that was where reason took its departure and travesty made its *début*.

In reply to the question as to whether he would do a resection of the knee without antiseptic precautions, he desired to be distinctly understood as saying that he *would* do it *without* the customary antiseptic precautions, and that if his knee was to be resected he would only permit it to be done with the understanding that the operation was not to be the usual antiseptic one. This he considered to be but a rational course for him to adopt, else he could not be consistent with the views he had expressed this evening. If everything else was properly done, he considered the patient the gainer rather than loser if antiseptic precautions were avoided.

As the first two gentlemen had already stated, the subject of the evening was so vast that thoroughness in its consideration was impossible. He had made a mere outline defense on the discussion, and time permitted nothing more. He had been largely misunderstood, and that too on some radical points. His statements and claims had therefore not been fairly met. The principles for which he spoke were really left almost entirely unimpeached in the whole adverse discussion. He regretted the length of the paper, which had caused it to be so rapidly read as to interfere with its clearness. He thanked the society for its close attention, and also the gentlemen who were sufficiently interested to discuss the question.

Meeting of March 25, 1886.

The President, Dr. B. F. WESTBROOK, in the Chair;

Dr. A. H. P. LEUF, Secretary.

A Peculiar Case of Pregnancy.—Dr. WALTER J. COCCORAN related the following history: In the last of August, 1885, Mrs. V. applied at St. Mary's Hospital for the repair of a lacerated cervix. Her last child had been born two years before, after a tedious labor, terminated by the forceps. Since that time she had been under constant local treatment for "ulceration of the womb," etc., by several physicians, the last of whom recognized the true condition and sent her to the hospital for operation. Since the birth of her child menstruation had occurred only at intervals of four and five months, the last time being in June. This was the only noteworthy symptom connected with the case. Examination showed an extensive bilateral laceration, the uterus large and soft, and five inches in depth. She was put on the usual preparatory treatment.

About the middle of September the laceration was closed by Dr. Byrne. During the operation it was noticed that the tissues were unusually soft, and that there was a very free oozing from the raw surfaces, though no large vessels were cut. The period of repair was normal, and in two weeks the sutures were removed and union was found to be perfect. When the sound was introduced it passed five inches. Thinking that it might possibly have passed into a dilated tube, the sound was well curved and rotated in the cavity with the same result. To reduce the size of the uterus, which was supposed to be in a condition of exaggerated subinvolution, a paste composed of iodine, iodide of potassium, ergotin, and glycerin, was ordered to be introduced into the uterine cavity twice a week by means of Dr. Byrne's intra-uterine applicator, and fifteen minims of ergot were given three times a day. This treatment was continued about four weeks, with no result whatever. After each introduction of the paste, membranous shreds came away, as is the usual result. There was no colic, no ergotism. In the last week in October, after the accustomed application had been made, the patient calmly announced that she had milk in her breasts. This statement first aroused the almost impossible suspicion that the enlargement of the uterus was due to pregnancy, even despite the manipulations it had undergone. A careful examination was then made to settle this point, but none of the positive signs of pregnancy could be found. The sound *had* passed (it was not passed again) in the median line to a depth of over five inches. The patient's abdominal walls were very thick and very lax, so that a large fold could be grasped in the hand. The uterine tumor was all in the right side, not extending, or but very little, across the median line

(although the sound passed in the center) and reaching half way to the umbilicus. Ballottement, rhythmic contractions, placental bruit, fœtal heart-sounds, were all absent or could not be detected. There had been amenorrhœa since June, but during the previous two years she had menstruated only at intervals of four and five months. There was no nausea or other sympathetic disturbance. There was a slight areola, also a secretion in the breasts. If she was pregnant, she was in the beginning of the fifth month. She had been subject to constant local treatment. The sound had been occasionally used to determine the depth of the uterus. In the third month a bilateral laceration of the cervix had been repaired, and during this operation there was a large loss of blood and the uterus was drawn down by a spreading double tenaculum opening in the cervical canal. A strongly curved sound had been freely rotated in the cavity, not a drop of blood following its use. A compound which caused exfoliation of the lining membrane had been introduced a number of times, and she had taken fifteen minims of ergot three times a day for nearly a month. Yet there was a strong suspicion of pregnancy, possibly extra-uterine, or in one horn of a double uterus.

No diagnosis was made, and developments were awaited. Itwas needless to say that further medication ceased. Soon after this the patient reported that as soon as she stopped her medicine (ergot) the movements, which before were very ill-defined, became much stronger. The uterine tumor became gradually more central, and about the middle of November the fœtal heart-sounds were heard. Ballottement was obtained, not through the cervix, but anteriorly through the body of the uterus, and the fœtus was undoubtedly in the uterus. Dr. Byrne saw the patient and confirmed this opinion. On January 4th, during a severe coughing spell, the funis was projected from the vulva, and, although it was replaced and retained within the uterus, she was delivered the following night of a still-born child of about seven and a half months' development. The epidermis was slightly macerated and peeled off the scrotum and anterior aspect of the thighs. The placenta was attached to the right side and was exceedingly soft and friable.

Dr. A. H. P. Leuf remarked that he had had a somewhat similar experience, which was too good to keep. Some four months ago he had been called to see a woman of forty-five years, presumably at the menopause for nearly two years, as indicated by the irregular menstruation during that time, and its total cessation for four or five months. She thought she was pregnant, but was uncertain. She was the mother of seven or eight children. The usual signs of her other pregnancies were absent except lacking menstrual discharges and some abdominal enlargement. This tumefaction was on the right side just above the brim of the pelvis. It was a little sensitive on pressure, and occasionally caused pain spontaneously. A careful examination of the uterus admitted of a positive demonstration, even to the husband, who was present, that uterine pregnancy was utterly impossible. The probe entered the uterus

along the uterine wall to the fundus, and was withdrawn along the posterior wall. It was again passed up on one side, swept around, and brought back on the other. A bimanual examination demonstrated the uterus to be freely movable and only slightly elongated. The possibility of an intra-uterine pregnancy was most positively denied, and a fear expressed that the abdominal tumor might be an extra-uterine pregnancy. She was not seen again, but her brother reported that she continued to suffer occasional pain, there was still no appearance of the menses, and the patient was troubled with mental uneasiness about her future condition. The brother was urged to send her around for re-examination. While the speaker was making a professional visit to the oldest child of this woman, and upon her being questioned as to her present condition, she stepped over to a bed, drew aside a cover, and exhibited a two-weeks-old baby. She was not again examined. The baby was one she had been normally delivered of by a midwife. In all probability the membranes were firmly attached to the uterine walls to within the distance from the os to which the probe had penetrated. An anterior uterine fibroid might have led to the error following the bimanual examination. These cases simply taught us the ease with which such errors might at times be made and yet not the least blame attach to the physician.

A Case of Acute Miliary Tuberculosis of the Lungs and Genito-urinary Tract.—Dr. Leuf presented the following history furnished by Dr. John Horn, of St. Mary's Hospital: "Karl S., aged thirty-five, single, tailor, came to the hospital on March 2d, very feeble and much emaciated. He complained of nausea, from which he had suffered every morning; occasionally he had fever and chills. He had masturbated frequently—as often as five times a day on three or four occasions. Last December, during one of these exciting moments, he had attempted to relieve himself by masturbation, but the semen would not flow, and he said that after that time he had rapidly lost flesh and strength. During his stay at the hospital his temperature varied between 101° and 104° F.; there was no cough or expectoration or pain of any kind. He rapidly failed, had an intestinal hæmorrhage on the twelfth day, and died the next." Upon post-mortem examination, Dr. Leuf found the body markedly emaciated. Both pleuræ were adherent throughout. An empyemic cavity, triangular in shape and about a centimetre in diameter, was found on the lower and outer side of the right lower lobe. The right upper lobe was solid with tubercular infiltration, part of which was becoming cheesy. The middle lobe was similarly affected, but not so far advanced. The lower lobe was congested and slightly infiltrated with tubercles. The left upper and lower lobes were also solid with tubercles, excepting a small cavity in the apex. The heart was normal but flaccid. The pancreas and spleen appeared as usual. The liver was firm and pale. The stomach was distended with gas, and the intestines were markedly anæmic. The right kidney was enlarged, its pelvis dilated, and the ureter thickened and

dilated. Almost the entire kidney was tubercular, with nearly the entire mucous membrane breaking down and exfoliating. A cyst over two centimetres in diameter was found in the upper part of the left kidney. Tubercular deposits were found in the center of this kidney involving the pyramid and cortex, being most marked at the pyramid's base. The entire mucous membrane of the bladder was thickened with tubercles and cheesy material, and its surface was in a state of total disintegration. The base of the viscus contained a heap of *débris*, presumably from the bladder-wall and right ureter and renal pelvis. The right testis was of double the normal size, and almost entirely tubercular. The left was atrophied and softened.

A Specimen of Sacculated Bladder.—Dr. Leuf presented a specimen, with the following comment: A sacculated bladder, also known as *appendix vesicæ*, was not a common occurrence. It was due to a separation of the muscular fibers of the vesical wall, thus permitting an extrusion of the mucous membrane. The increased pressure that determined this condiiton was due to urinary retention, stricture, tumors, and obstructions to the outflow of urine generally. The protruding portion might become quite large, as in the specimen presented, when its average diameter was nearly seven centimetres. The orifice was usually small, with thickened edges, because of the crowding of the marginal fibers and their hypertrophy. On the specimen shown the opening measured a little less than one centimetre in diameter.

The following paper was then read:

THE EFFECTS OF DISEASES OF THE NASAL PASSAGES ON OTHER PORTIONS OF THE RESPIRATORY TRACT.

By THOMAS R. FRENCH, M. D., Brooklyn,

CLINICAL PROFESSOR OF DISEASES OF THE THROAT AND NOSE IN THE LONG ISLAND COLLEGE HOSPITAL.

Nasal disorders, as ætiological factors in the production of diseases in or symptoms referable to other parts of the body, have received so much attention of late that our president, believing that a discussion of the subject would be of interest to the general practitioner, has requested me to bring it before you this evening.

The subject in all its bearings would be too great for an evening's discussion, and I will therefore confine my remarks to the effects of diseases of the nasal passages upon other portions of the respiratory tract.

There are three ways in which diseases of the nasal passages may give rise to disorders in other parts of the respiratory apparatus:

1. By catarrhal discharges. 2. Indirectly by causing the habit of mouth-breathing. 3. By reflex irritation.

By Catarrhal Discharges.—The anatomical arrangement of the nasal passages is such that, for the most part, the products of inflammatory processes in this region are drained off into the cavity of the pharynx. The secretions flow downward and backward and collect upon the posterior surface of the soft palate. This structure is raised in the act of swallowing, when the collections are wiped off upon the upper portion of the posterior pharyngeal wall, and from that situation they flow downward to the pharyngeal orifice of the œsophagus. During quiet respiration the arytenoid cartilages and the tissues lying between them, constituting the posterior wall of the larynx, lie flat against the posterior pharyngeal wall. The upper edge of the posterior wall of the larynx is pressed closely against the pharyngeal wall, and so diverts the stream of mucus or muco-pus from the pharynx into the cavity of the larynx.

In October, 1880, I read a paper before the New York Laryngological Society on the relation of nasal catarrh to chronic catarrhal laryngitis. In the discussion which followed, the members who spoke to the paper stated that it had not before occurred to them that nasal discharges found their way into the laryngeal cavity. To prove that this does take place, I described an experiment which I had made upon twenty-five subjects, and which consisted of applying a solution of Prussian blue to the posterior wall of the pharynx, just behind the velum, in sufficient quantity to flow slowly down the membrane. In all but two cases, within a half-hour after the applications were made the laryngoscope disclosed the fact that some of the colored mixture had found its way into the laryngeal cavity. As this mixture had to travel the same pathway as that taken by the secretions dropping from the back of the nose, no more conclusive demonstration could be had to show that nasal discharges do get into the larynx. The discharges from the mucous membrane of the nasal passages, when the seat of catarrhal inflammation, are of an acrid nature, and their prolonged contact with normal mucous membrane becomes sufficiently irritating to cause inflammatory processes of like nature. The discharges are at times so copious that a continuous stream of muco-pus can be seen extending from the posterior wall of the pharynx over the inter-arytenoid tissue into the larynx. In many instances a broad and well-defined strip of diseased membrane marks the pathway of the discharges from the posterior nares to the œsophageal opening, and from thence over the arytenoid car-

tilages down the posterior wall of the larynx to the vocal bands. Pharyngeal and laryngeal catarrh are, therefore, common results of catarrhal inflammation of the nasal mucous membrane.

The question may now occur to you, If nasal discharges find their way into the larynx, why may they not continue their course downward to the bronchi and excite a bronchitis, and eventually pulmonary phthisis? This is a question in dispute. While I do not deny the possibility of such a relation as cause and effect, I am of the opinion that it rarely if ever occurs. Nasal catarrh is almost invariably present in pulmonary phthisis. This is unquestionably the result of the impaired vitality due to the constitutional disorder. The same influences which predispose to the development of pulmonary disease are exerted in the production of catarrhal inflammation of the upper air-passages. Nasal discharges find their way into the larynx, and in some instances a short distance into the trachea. The mucous membrane lining the trachea is highly sensitive and intolerant of the presence of irritating discharges. Chronic catarrhal inflammation is not apt to extend except as a result of irritation from its discharges, and, as the discharges from nasal, pharyngeal, and laryngeal catarrh do not get far into the trachea, it is difficult to understand how a chronic nasal catarrh can ever act directly as a cause of bronchitis. The two diseases may co-exist and result from independent causes, or the catarrh of the upper air-passages may be caused by the irritating discharges coughed up from below. There can be no doubt that stenosis of the nasal passages, by giving rise to the habit of mouth-breathing, assists in bringing about a depraved condition of the body as the result of which phthisis may be developed, but I believe it quite unlikely that even such a condition can act directly as a cause of phthisis.

Indirectly by causing the Habit of Mouth-breathing.—The nasal passages, besides being the seat of the sense of smell, serve to warm, cleanse, and moisten the air inhaled into the lungs. If they become obstructed, respiration must of necessity be carried on through the mouth. Under these circumstances the air is not sufficiently warmed, filtered, or moistened to be deprived of its irritating qualities.

The continued irritation from dry, cold, and unfiltered air upon the mucous membrane of the upper air-tract soon results in the establishment of catarrhal inflammation, the parts most affected being the tongue, pharynx, and larynx. During the process of mastication, respiration is greatly interfered with, perhaps suspended.

The tendency is, therefore, to swallow the food as quickly as possible, in order to permit free respiration through the mouth. The food being imperfectly masticated and insalivated, greater labor is required of the stomach than it is capable of performing with ease. Dyspepsia is therefore the natural consequence.

The fact that great general improvement usually occurs after nasal respiration has been re-established, through surgical or other interference, proves that the habit of breathing through the mouth interferes with general nutrition. The subjects of this habit are usually anæmic, spare, and dyspeptic, though it must be stated that occasionally the throat is apparently the only part of the body which suffers. The throat is always the seat of catarrhal inflammation in subjects who rely upon the mouth for respiration.

By Reflex Irritation.—Irritation of the mucous membrane of the upper air-passages frequently gives rise to various reflex phenomena. Irritation of the nasal passages may cause spasm of the glottis, though when the mucous membrane covering the laryngeal muscles is irritated the spasm may not occur. The introduction of the laryngoscopic mirror or the application of astringent solutions to the fauces may also cause laryngeal spasm. It is therefore not unlikely that some disorder of the nose or pharynx may occasionally act as the exciting cause of laryngismus stridulus in children.

Cough may occur as the result of irritation of the nasal cavities by means of a probe, or from the presence of a foreign body, morbid growth, or swollen mucous membrane. The susceptibility to irritation varies. The slightest touch is sufficient to cause cough in some cases, while in others it can not be produced by any amount of irritation. That *bronchial asthma* may be caused by diseases of the nasal and pharyngeal cavities no longer admits of doubt. Voltolini, in 1871, was the first to call attention to this fact by recording a case of asthma resulting from the presence of polypi in the nasal cavities. It has since been demonstrated that swelling or hypertrophy of the mucous membrane of the nose and of the glandular tissue in the pharynx may also excite asthma and cough. There exist in the nasal cavities sensitive areas which, upon being irritated, may excite reflex phenomena.

The positions of the sensitive spots vary somewhat in different individuals, but, as has been pointed out by Dr. Mackenzie, of Baltimore, they are most marked and constant in the posterior portions of the cavities. This observer believes that the most sensitive area is located in the lower posterior portions of the nostrils. Diseased

conditions are present in this region much more frequently than in the superior posterior portion of the nares, but I have observed that, when the upper portions are subjected to irritation, from pressure caused by the presence of nasal polypi, the reflex symptoms are quite as marked. In a case of nasal polypi in which the rhinoscope showed the growths to be situated in the upper portions of the nasal cavities and confined to those portions, the asthmatic symptoms were quite as severe as when the lower portions of the canal are the seats of irritation. But I have not yet seen a case of reflex cough or asthma dependent upon a pathological process in the nose in which the brunt of the disease, or the greatest pressure, was not borne by the posterior portions of the nasal canals. In some cases small polypi or a moderate amount of thickening of the tissues in this situation are sufficient to cause reflex manifestations, while in others no amount of irritation or disease is capable of producing them.

The following case will serve to illustrate the severe reflex symptoms which may be occasioned by the presence of polypi in the nasal cavities:

Dr. ——, a practicing physician in this city, consulted me in May, 1881, on account of severe asthma and cough from which he had been suffering for about four years. There was more or less obstruction to nasal respiration, which had existed for a long time prior to the development of the chest symptoms. The asthmatic symptoms were always worse at night. At times they were so severe that he was obliged to sit up for hours. At such times he had noticed that the nasal passages were completely obstructed. In the daytime, when he suffered the least, the nasal passages were comparatively free, but he was rarely able to depend upon them entirely for respiration. When he awoke in the morning he was short of breath, and, as soon as he got out of bed, was seized with a violent paroxysm of coughing. Attacks of coughing occurred frequently day and night. Blowing the nose or attempted deep inspiration would invariably excite cough. He had lost flesh and strength, and much of the time was unable to attend to his professional duties. Examination of the nasal passages revealed the presence of a number of large polypi. These were removed with the snare and forceps in several sittings. The removal of the growths from the anterior portions of the nares gave no relief, but, after the growths springing from the posterior portions of the passages had been detached, the asthmatic symptoms disappeared entirely, and the cough was greatly improved. In October last the doctor consulted me again, as the chest symptoms had begun to return. Careful examination failed to reveal the presence of a growth, but with a slender forceps I was successful in detecting and removing

quite a large polypus from the posterior portion of the left naris. The asthmatic symptoms disappeared at once. The cough was not at all relieved for a week, but after that it gradually grew less, and at the end of a month had almost entirely disappeared.

As I have already stated, swelling or hypertrophy of the nasal mucous membrane may be the exciting cause of bronchial asthma. In recent cases the reduction of the swollen membrane is often followed by the most satisfactory results; but, in chronic cases of years' standing, even if originally induced by the nasal disorder, such treatment will, I believe, prove of but little if any value. I recently undertook the treatment of a case of chronic asthma, hoping that, by the removal of the apparently offending tissue in the nasal chambers, good might result, and also with the view of testing the value of local treatment of the nasal mucous membrane in such cases.

The patient, a lady, had had frequent attacks of asthma during the past ten or twelve years, averaging at least one attack a month. I found two large masses of hypertrophied tissue springing from the posterior extremities of the inferior turbinated bones, and, as during every attack they both became greatly swollen and completely obstructed nasal respiration, it seemed to me quite probable that they were the reflex cause of the attacks. I therefore removed both masses, and made a number of applications of the galvano-cautery to the swollen turbinated bodies. The attacks have since occurred as frequently and severely as before, though now nasal respiration is at all times perfectly free.

There are other reflex phenomena which may be excited by a pathological condition in the nasal passages. Prominent among these are redness of the tip of the nose, headache, and facial neuralgia. The proof lies in the fact that successful treatment of the nasal disorder is often sufficient to dissipate these conditions.

Until recently the disease known as "hay fever" or "hay asthma" was generally believed to be due to a peculiar idiosyncrasy as the predisposing cause, and the pollen of certain grasses as the exciting cause. Latterly, however, the writings of Daly, Roe, Allen, J. N. Mackenzie, Sajous, and Hack have thrown much new light upon this obscure disease. Most of these writers believe that the predisposing cause is a diseased condition of the nasal mucous membrane, associated with either central or peripheral nerve derangement, and that there is a great variety of exciting causes. It is maintained that, whether there is apparent disease or not, there is always hyperæsthesia of certain portions of the mucous membrane. These sen-

sitive spots or areas vary somewhat in different individuals; but, as I have already said, they are most frequently found in the posterior portions of the nares. Irritation of these sensitive spots causes vaso-motor disturbances, which result in swelling of the membrane, increased secretion, and perhaps some reflex manifestation. As has already been shown, pressure from morbid growths or swollen tissue in the nose may cause cough and asthma. It can, therefore, be easily understood that the asthma accompanying hay fever is caused by reflex irritation from the existing nasal disorder. For the production of a paroxysm of hay fever there must, I believe, be some structural change in the nasal mucous membrane, and a functional nervous derangement, which, however, is not well understood. These conditions being present, irritation being applied directly or reflected from neighboring or distant parts, the phenomena characterizing this disease are the result.

The pollen theory, it seems to me, is a plausible explanation of the fact that the great majority of cases of hay fever occur in the summer months, but it certainly can not account for the attack occurring regularly at a certain date. Functional nervous disturbance may possibly explain this feature.

Dr. Mackenzie, of Baltimore, is of the opinion that an attack may be occasioned by psychical causes, and describes a very interesting experiment to prove that such is sometimes the case.* It is further maintained that, as a proof that the cause of this disease lies in or is associated with the nasal mucous membrane, the removal or cauterization of the surfaces of the diseased membrane will certainly relieve and may cure the disease. The intemperate statements made in support of this treatment by some writers has, I understand, injured it in some quarters, for a number of cases reported cured have relapsed. Considerable time will be needed before the proportion of cases which can be relieved or cured by this method of treatment can be determined. My experience with it in the treatment of hay fever is limited to three cases. In one case there was great obstruction to nasal respiration, due mainly to hypertrophy of the inferior turbinated bodies. The treatment was begun three months before the expected attack, and consisted of the removal of a mass of hypertrophied tissue at the anterior extremity of the turbinated bone in the left naris, and twelve or fifteen applications of the galvano-cautery knife to the thickened tissue in both nares. This

* "American Journal of the Medical Sciences," January, 1886.

was sufficient to re-establish free and permanent nasal respiration. The annual attack was delayed a few days, and, so far as the nasal symptoms were concerned, was milder than usual; but the asthmatic symptoms were more severe than any the patient had had. In the other cases the treatment consisted of making ten or twelve applications of the galvano-cautery. The results were quite gratifying, for the following attacks were milder than any either of the patients had had. It will be seen that destructive treatment, freely applied, did not bring great relief in these cases; but it would be unreasonable to draw conclusions from these examples, for the reports of many writers of recognized ability show that much better results have been obtained from this method of treatment at their hands.

It is probable that the benefit derived from the use of destructive agents within the nasal cavities is due to the fact that the terminal nerve filaments are destroyed. For, if the paroxysms were due to hypertrophied tissue, this condition would have to be present in all cases of hay fever, and date back to the first attack. It is, however, much more likely that the swollen tissue is the result rather than the cause of the periodic attacks of acute inflammation. When hypertrophy exists, there can be no question as to the propriety of the application of destructive agents, if skillfully made by one who is experienced in their use; but, when the nasal mucous membrane is in an apparently normal or only moderately congested condition, the destruction of the terminal nerve filaments in extensive sensitive areas by means of the galvano-cautery would, at the same time, involve the destruction of a large amount of glandular tissue. Whether the injury inflicted by this destruction would not more than overbalance the discomforts of an annual attack of hay fever is a question worthy of consideration.

Much has been written during the past few months regarding the use of cocaine in the treatment of hay fever. My experience with this drug would indicate that in many cases it is of value and affords great relief. In one case, in which the disease was at its height and asthma had been present for three days, the application of a 4-per-cent. solution gave prompt relief, and in forty-eight hours the asthmatic symptoms had disappeared.

In some cases, however, though temporary relief is obtained, the effects of the drug soon pass off, leaving the membrane in a more swollen condition than before it was applied. In such cases the temporary relief afforded does not compensate for the subsequent asthmatic distress occasioned by the increase of the swelling.

Dr. J. H. STERLING thought that Dr. French had laid hardly enough stress on the objections to mouth breathing. He believed it to be the cause of much trouble. In many cases it was due to partial and undetected nasal obstructions. He related a case, then under his care, of a woman with bronchial asthma and double facial neuralgia and swelling. Nothing was visible in her nares. A slight local application, though, to the nares would increase the asthma and the neuralgia. Yet, if kept up for a number of times, this treatment proved very beneficial. She was better then than she had been in eight years. There was no nasal obstruction, and still the breathing was through the nose. He thought these cases were occasionally encountered. He had always found cocaine injurious in hay fever, because of the subsequent swelling of the membrane to which it was applied, although at first it relieved. He had seen cases relieved by destruction of tissue. He did not like cocaine.

Dr. R. G. ECCLES related the case of a man with asthma, whose attacks came on instantly, and were only relieved by his going at once out into the open air. It was supposed that the pollen of some grasses caused hay fever. The speaker did not consider that a rational inference. The quantity was too small, and there was no chance of increase. When grass was cut, it was covered with the *Bacillus subtilus*, and this might be the cause. He simply threw this out as a suggestion. He thought that all who used cocaine were agreed that, instead of congesting, it had the opposite effect. Some preparations seemed to cause congestion, but he thought that was caused by additions to the fluid to preserve it.

Dr. STERLING replied that, in his experience, the anæmia following an application of cocaine was always succeeded by a congestion and tumefaction of the mucous membrane to which the application had been made. Ofttimes there was more hæmorrhage in these cases than usual, and this he believed to be due to the after-effects of the use of cocaine. He would like to know Dr. French's experience.

Dr. ELIZA M. MOSHER inquired if Dr. French ever made use of any mechanical appliance in mouth breathing? She thought many children breathed through the mouth because of short upper lips. Was there any appliance to use in these cases, and was it advisable?

Dr. FRENCH said that there were three ways in which cocaine had been proved to be of the greatest value when used in the nose. First, for diagnostic purposes; second, to obtund sensibility preparatory to the application of destructive agents to the nasal mucous membrane; and, third, in arresting the inflammatory process in acute coryza. When a weak solution of this drug was applied to the lining membrane of the nose, the tissues contracted almost immediately and exposed to view the entire nasal chambers. This action was a very important one, for it not only enabled us to determine the nature and seat of the disease, but also permitted the application of remedies and the direction of instruments with a greater degree of accuracy than was possible under almost any other circumstances. In addition to this, its local anæsthetic action enabled us

to make painless applications of destructive agents. He had frequently been able to destroy hypertrophied tissue in the nasal passages of children in this way. Again, in many cases, the application of a 2- or a 4-per cent. solution of cocaine would arrest the inflammatory process in acute coryza. In others the symptoms were relieved, while in others still, perhaps the majority of cases, because of the swelling which often occurred a few hours after the application of the remedy, to which Dr. Sterling had referred, the trouble was greatly aggravated. With the hæmostatic action of cocaine he had not been impressed, but he had not observed that unusual bleeding occurred in the part to which it had been applied.

In reply to Dr. Mosher, Dr. French said that, though subjects with short upper lips commonly breathed through the mouth, such a condition was usually the result rather than the cause of the habit. Ability to breathe through the nose could be easily tested by keeping the mouth closed for a time. If in this way, or by inspection with the aid of the nasal speculum, the nasal chambers were found to be large enough to permit the passage of a sufficient amount of air, an attempt should be made to keep the mouth closed during sleep. For this purpose he was in the habit of using a material known as "wash blonde." It was a kind of "illusion." A strip about four inches wide and of sufficient length was placed under the chin and the ends were tied at the top of the head. To prevent this from slipping, a narrower strip was passed around the head, across the forehead, and tied behind. The two strips could then be fastened together with a few stitches or safety-pins. In this way the jaws might be held together. The material was quite elastic and could, as a rule, be worn without discomfort. As the habit of breathing through the mouth was apt to cause dryness of the throat, the comfort derived from wearing this head-dress was often very great.

Meeting of April 22, 1886.

The President, Dr. B. F. WESTBROOK, in the Chair;

Dr. A. H. P. LEUF, Secretary.

RAYNAUD'S DISEASE.

BY J. C. SHAW, M. D.,

CLINICAL PROFESSOR OF NERVOUS DISEASES AT THE LONG ISLAND COLLEGE HOSPITAL, BROOKLYN; MEDICAL SUPERINTENDENT OF THE KINGS COUNTY INSANE ASYLUM.

THE condition to which I invite your attention is one of considerable interest, and only within recent years has the attention of physicians been directed to it.

For the purpose of elucidating the clinical history of this condition, I shall give briefly the histories and description of some cases. The marked features in these cases are the localized blanching of the fingers or toes, nose, or ears, and in some cases localized gangrene of these parts:

CASE I (Personal).—A woman, aged fifty, admitted to the asylum with melancholia, delusions of poisoning, etc., attempts at injury to herself, refusal of food, and resistance to every effort made to do anything for her. One morning when visiting her I picked up her hand to examine her pulse, and was surprised to find the index and middle fingers, up to the joint of the second phalanx, extremely pallid and death-like. When felt, they were intensely cold. This condition of pallor lasted some time, then passed away, and I never observed it again in the patient. It was impossible to learn if this condition had ever occurred before to her.

CASE II (Personal).—M. S., aged fifty-one, seen first December 12, 1882, having been sent to my clinic for nervous diseases, in the Brooklyn Eye and Ear Hospital, by Dr. Alexander Clark. Patient is of spare build, but healthy-looking. Has enjoyed good health in former years. Eight months ago began to have some trouble with right shoulder; could not move it as well as formerly, and, when she did move it to any great extent, it pained her. About this time she began to notice that the little and ring fingers of the left hand would suddenly become cold and white, lasting about half an hour, and then pass away. At first she had these attacks about once a week; at present she has them every day.

While being examined she had an attack. The entire little finger, and the next finger up to the joint of the second phalanx, became suddenly intensely pale and death-like; they were cold to the touch, and the

patient said they felt cold. This pallor lasted about half an hour; it was followed by a feeling of warmth, and, as the patient said, one could almost see the blood as it returned to the fingers; they grew red and warm.

CASE III (Dr. T. A. McBride, in a paper before the New York Neurological Society, April 1, 1878; partially reported in New York "Medical Record," April 11, 1878).—Man, aged thirty-two, of neurotic constitution. Certain parts of the index and middle fingers of both hands, also of end of ring finger of right hand, at irregular intervals and at varying periods, became cold, of a dead-white paleness, numb, and stiff, with some loss of sensibility, and were moderately painful. These symptoms were replaced by a dusky, often purplish-red color of the same parts, accompanied by a sensation as of having been stung by nettles, and soon after the affected portion of the fingers regained their normal appearance. The phenomena appeared to occur independently, occurring when the patient was otherwise healthy as well as when sick. No similar phenomena had been observed elsewhere in the body.

CASE IV (Dr. Barlow, "Clinical Society Transactions," April 27, 1883).—In October, 1882, there appeared in the out-patient room a little girl aged five. Within a short time the whole of right foot and ankle, and the leg for a distance of three or four inches upward, had become cold and of a nearly uniform grayish-blue color. The child whimpered a little with pain in the foot, and did not like it to be handled much. Just below both elbows, on the dorsal surface of the forearm, there was an area of perhaps three inches in length, of ill-defined blueness and coldness. This slight blue area was more marked on the right than on the left side. The child had no cardiac disease. It was admitted into the hospital ward of Dr. Fox, and this condition passed off in an hour or two, and the next day the child seemed perfectly well.

The second day after, at 3.30 P. M., while sitting in the ward, she had another attack, which Dr. Barlow saw. There was slight blueness and coldness in the left foot and ankle. The child whimpered a little, but was able to walk across the ward with a slight limp; the foot became natural again within less than half an hour, and she had no further trouble. From a history obtained subsequently, it was learned that she was nursed nearly two years, was late in teething, and was probably rickety to some extent. She had not suffered from any of the acute specific diseases, and there had been nothing special in her history until February, 1881, when she was about three years and a half old. It was very cold weather, and the child was out of doors, but carried in somebody's arms. When brought into the house she complained of cold feet, and vomited some watery stuff. Her feet were quite blue, and the blueness extended for a short distance above the ankles. The blueness lasted from five o'clock until midnight. Next day she was all right. Seven months passed before she had another attack, and this was in the month of September. The blueness lasted two hours. She had another attack in a week's time, and

several other attacks during the winter. Since that time the attacks have always been confined to the cold weather. The attacks occur mostly in the afternoons; never at night. The duration of the longest attack has been seven hours; but usually the attacks pass off in less than an hour. Latterly the elbows have been affected, but the ears and nose never have been.

CASE V (Dr. Barlow, "Clinical Society Transactions," 1883).—A girl, aged five, of healthy parentage, had been nursed twelve months, and, with the exception of what was called "congestion of the brain from teething" at sixteen months, had been a healthy child. She had had whooping-cough and measles when one year old; never had ague. In September, 1881, being then three years and a half old, she had her first attack of coldness and blueness, with pain affecting one foot, and lasting for several hours. Very soon after this attack commenced, the child passed some very dark urine. She had another similar attack in a few days, and then repeated attacks during the winter until April, 1882. There were sometimes two or three during the week; the duration was not generally more than three hours. The attacks occurred most commonly at midday; the pain always preceded the coldness and blueness. The child did not pass dark urine with every attack, and never more than once with each attack. During the first winter, along with these symptoms, she complained on some occasions of pain in her stomach, and in one attack the left hand became blue and cold up to the wrist. The last attack of the first winter was on May 6th. She was then free until September, 1882. Dr. Barlow saw her in February, 1883. Up to that time she had sometimes gone fourteen days without an attack, and at other times she had had two in a day.

March 15th.—For about eight days she has had an attack daily in left foot, but on some days in both.

CASE VI (Dr. T. C. Fox, "Clinical Society Transactions," 1885).—Mrs. S., aged forty-one; family history good; no evidence of any neurosis; never had rheumatism or any special illness; married at twenty-seven, and had six children, including twins at last confinement; no miscarriages. Dates her illness from June, ten years ago, when she moved into a damp house. Her fingers then began to grow at frequent intervals white and dead, all of them simultaneously on both hands, "like wax," as she expressed it, and they pained her excessively. Gradually her feet also became involved, and up to the present time the recurrences have been getting more frequent. She is now a woman of spare habit, and with an anxious face and intensely nervous temperament. She sleeps poorly, and has had two attacks of hysteria. Heart and other organs healthy. There is no diabetes. When seen in February the condition of the fingers might easily have been mistaken for scleroderma; all of the fingers were icy cold, of a slightly blue tinge, fusiform in shape, the skin over them shining and sunken; the nails were variously affected, and some of the bones atrophied. The history, however, made the nature

of the malady clear. On subsequent occasions I have seen all the fingers slightly swollen and of various shades of lividity up to the metacarpo-phalangeal joints. Occasionally the asphyxiated condition of one of the fingers will lead to the formation of a blood-blister; the contents subsequently become puriform, and, on the rupture of the bullæ, an ulcerated surface is left, which is very slow to heal. At the time of writing, the left ring finger is ulcerated at the end and under the nail. In the toes the disease is less severely felt, but their ends are somewhat blue and cold. The tip of the nose is rather blue. The influence of cold is very marked. Her ears and nose grow blue and cold directly she goes out of doors; her hands and feet get intensely livid, with an "agony of pain." She also states that her extremities grow blue "in a second" if she is startled by a sudden knock at the door or any unusual occurrence, and her heart "feels as if in a vise."

Her pulse is thready and compressible. There has been no hæmoglobinuria, and her blood appears to be normal.

Case VII (Dr. T. C. Fox).—Man, aged fifty-one, of regular life. He was a stout, florid-complexioned man of remarkably good physique, but yellow conjunctiva; complained of feeling weak. He applied to Dr. Fox on account of two oval, symmetrical, gangrenous sores, of about the size of a half-crown, one at the junction of the middle and lower thirds of each shin. These sores were covered with an adherent black eschar, and they had originated suddenly in blood-blisters. There were also a few pustules scattered around. His feet and hands were cold and his pulse was soft and weak, but, with one exception, Dr. Fox could find no other diseased condition. He was suffering from marked diabetes, but was not aware of it. The sores were very obstinate to heal, and on March 28th another congestive patch appeared on right shin, which seemed to threaten gangrene. On January 2, 1884, he again applied to Dr. Fox, who says he did not recognize that the man was suffering from Raynaud's disease until January 5th, when his left great toe became suddenly black and swollen and intensely painful. Inquiry now developed the fact that for years he had suffered from sudden blanching and numbness of the digits. He had formerly been a door-porter in a store, and exposed to draughts.

Case VIII (Dr. Charles K. Mills, "American Journal of the Med. Sciences," 1878, p. 431).—E. J., aged thirty-two, single, mill-hand. Mother died of phthisis; well until nineteen years old, except always suffering from excessive sweating of hands and feet. At nineteen she took a severe cold, from which she suffered several weeks. One morning in the early autumn, on her way to work, the little finger of her left hand, as far as the second joint, suddenly became cold, white, and numb. After this, whenever exposed to cold, one or more fingers would present this appearance. Dr. Mills found a mitral presystolic murmur; the lungs showed impaired percussion resonance and vesicular murmur, and there was a cavity of considerable size in the right apex. Six months after

her first attack her little finger was first affected. A swelling formed at the point of the thumb as if a splinter were in it; it suppurated and a small abscess formed, and was a long time in healing; from time to time thereafter small abscesses formed on ends of fingers.

CASE IX (Personal).—M. D., aged forty, an insane woman, confined in the Kings County Insane Asylum. Patient has always been of a disagreeable, fault-finding disposition, and of a very low order of intelligence, which her physiognomy also indicates. She has a paternal aunt insane. Patient has had delusions of poisoning, with consequent refusal of food; made many attempts at suicide; has often been violent, owing to her delusions of persecution. In August, 1883, she became quite agitated and remained in this condition many months, talking in a loud voice, attacking all who came near her; in constant motion; never sat down. In September it was observed that she had a small gangrenous spot on the end of the middle finger of the left hand; she resisted when an attempt was made to look at it, but was held; it was then found that she had complete gangrene of the end of that finger, and each finger on that hand had, on each side of the nail, a small black gangrenous spot. The gangrene of the first phalanx of the middle finger in the next week extended so as to involve the entire phalanx; it was black, and evidently quite dead and sloughing. The small spots on the other fingers had grown a little larger. It was now found that the right hand had also begun to have the same small black spots on every finger on each side of the nail; the gangrenous spots on this hand were not larger than the head of a large pin. Her feet were examined, but no similar condition was found, although they were very much swollen. Her urine showed nothing abnormal. Her heart could not be examined, as she had to be held and fought constantly when approached, but the record shows that, on her admission, her heart was normal. In the course of several weeks the black spots on the right hand disappeared without ulceration, but on the left hand the middle finger ulcerated and sloughing took place.

At the present time the finger is not yet well; the ulcerated surface is still not healed; she will not allow any dressing to remain on it.

CASE X (Dr. Southey, "Clinical Soc. Trans.," 1883).—F. N., aged nine, a large-headed, fair-complexioned, light-haired child. He enjoyed good health until the autumn of 1881, when he was attacked with some feverish illness, attended by pain in his limbs, which was believed to be rheumatism. On admission, he was greatly emaciated, and his hair was falling off in large quantities. He was in a very nervous and excitable condition, crying whenever an attempt was made to examine him, singing snatches of songs and hymns in a loud tone; by day he slept a good deal, but as evening approached he became very noisy, singing and screaming alternately. He used to pull handfuls of hair off his head. Appetite bad; tongue clean and moist; pulse, 148; no cardiac murmur, no physical signs of lung disease; urine presented no abnormality. The single noticeable fact observed was the localized gangrene of the tip of his right

index finger and the coldness of his extremities. The gangrene of the right forefinger crept slowly and steadily onward, and, in a few days, involved the entire terminal phalanx. On December 2d the thumb and second finger of the right hand were observed to be red, swollen, throbbing, and hot, just like chilblains, and there was a small purple patch upon the helix of his left ear, evidently a blood stasis. On December 4th this patch was still apparent, although smaller, but the third finger was assailed like the thumb, fore, and second fingers, and all four looked extremely livid and red, while redness and swelling of the thumb of the left hand were also present. On December 5th a spot exactly similar to that upon his ear of local blood stasis, threatening gangrene, appeared upon the extreme tip of his nose, and the tip of the right middle finger became quite black. During the ten days that the boy had been under observation his temperature was found in the morning, before 10 A. M., to be usually normal or only slightly elevated, 99·4°; in the afternoons and evenings it rose to from 101° to 102·8°.

On December 19th the tips of all the fingers of his right hand were gangrenous, and the flesh of the fingers below the gangrened ends was livid and swollen.

On the left hand, the thumb, index, and little fingers were extremely dusky.

In the course of the ensuing week the gangrene made rapid progress, spreading from the tips of all the fingers of the right hand backward and centripetally. On December 29th there were troublesome cough, broncho-pneumonic sputum, and tubular breathing over the lungs posteriorly. In the first week of January his general condition was improved; lines of demarkation between dead and living tissue were defined. Suppuration commenced. The cough improved, and he began to gain a little flesh.

On January 9th the urine was found to be acid, 1·012 specific gravity, and containing both blood-cells and albumin. It attracted attention by its dark color.

For several subsequent days it was natural-colored and of specific gravity varying between 1·010 and 1·025. He presented a true intermittent hæmaturia, provoked apparently by impressions of external cold on the surface of his body. Thus, after exposure and being washed, he would pass a specimen of urine containing blood, whereas urine passed a few hours later contained a mere trace or none.

During the latter part of January, February, and March, blood was more often absent than present in the urine, and this only very temporarily.

Throughout January suppuration and separation of the gangrened digits was taking place.

His temperature ranged between 97·4° and 101·4°; it always rose in the afternoon and sank in the morning. At the beginning of August he was able to walk about again.

Most of these patients presented an evident abnormal irritability of the nervous system, if not positive nervous disorder.

Dr. McBride's patient had anterior spinal paralysis, from which he recovered.

One of Dr. Barlow's patients was said to have had "congestion of the brain from teething."

One of Dr. Fox's patients eventually became a nervous hysterical woman.

Dr. Southey's patient was evidently hydrocephalic, and probably insane, when under his observation.

One of Dr. Fox's patients had diabetes with an evident neuropathic constitution to begin with. My three cases presented a neuropathic history. The exciting causes of the disease appear to be exposure to cold, most of the cases being very much worse in the cold weather.

Emotional disturbances, fright, etc., appear also to be excitants.

Many of the cases are associated with intermittent hæmaturia, which is probably due to the same causes as the gangrene and "dead fingers."

Some of the cases are also associated with diabetes.

The symmetrical distribution of the gangrene, and also of the blanched fingers, is remarkable, and was especially insisted upon by Raynaud.

Although a large number of the cases are symmetrical, especially those leading to gangrene, many are reported in which only one extremity is involved. This symmetry in the attack is seen even in cases in which the ears are the seat of the gangrene.

According to McBride, the development of dry gangrene from digiti mortui is rare.

According to Raynaud, the condition usually preceded what he called local asphyxia, which might be acute or chronic. If acute, it might go on without any disturbance of nutrition, but more commonly gangrene, more or less localized, occurred, and sloughs of considerable size might form, or, what seemed more common, after a small amount of gangrene had occurred, the local asphyxia disappeared and cicatrization followed.

In the chronic form, lasting some months, there might be localized gangrene followed by cicatrization, as in the acute, but more commonly there were manifested other alterations in the nutrition of the parts, so that the skin became much thickened and indurated.

Dr. Colcott Fox thinks that the changes left after this disease

may lead to its being confounded with scleroderma. It can, however, only be so confounded if a previous history is not obtained. Dr. Fox also remarks that in two unquestionable cases of scleroderma under his observation, in which the hands were involved, both women had long been subject to "dead fingers," and one of them continued to have mild attacks of asphyxia of the fingers after the onset of scleroderma.

It appears also that Vidal thinks there is an intimate connection between scleroderma and Raynaud's disease, and Brochin points out that the two diseases can be united in the same patient.

Dr. Allan McLane Hamilton, in an article on this subject, sums up by saying that it is characterized by—

1. Local blanching, lasting two or three weeks, or coming on in intervals of several weeks and lasting a few hours each time.
2. Sensation and motion unimpaired.
3. Temperature of affected members lowered.
4. Parts affected—hands.

Subsequently reported cases, however, have shown that we may have slightly elevated temperature as well as lowered, and the hands, feet, ears, nose, and even the body, may be the seat of these disorders.

A marked characteristic of these symmetrical gangrenes of the extremities is the complete absence of all causes of obstruction in the arteries. How, then, is this interruption to the flow of blood into the parts to be explained? Raynaud thinks that it is the result of a spasm of the small blood-vessels under the influence of an irritation to the vaso-motors of these vessels, and usually through a reflex act.

Raynaud thought that, in women who were the subjects of this disease, the pelvic organs might be the starting-point of the irritation, which was reflected upon the vaso-motors of one or more of the extremities, for some cases of localized asphyxia were observed at the time of menstruation. Many cases, however, appear to have had their primary seat of irritation in the extremities themselves—such cases as were produced by cold, for instance.

It appears probable that, whenever the vascular disorders are symmetrical or wide-spread, the monarchical vaso-motor center in the medulla oblongata may be involved, and one might be inclined to think that in these cases occurring in association with diabetes, this monarchical vaso-motor center was involved, and thus caused the localized spasms at the extremities, etc.

Dr. T. A. McBride also explains the condition as being due to reflex vaso-motor spasm. Vulpian does not fully accept Raynaud's view as to menstruation producing the starting-point from which reflexly the vaso-motors of an extremity are affected; he does not think this necessary to explain these cases, for he says at the menstrual period, in many persons, the nervous system is already often in a state of overexcitability; the least impression on the skin is apt to give rise to phenomena out of all proportion to the excitation.

More recently Raynaud has expressed the view that in these cases there is an exaggeration of the excito-motor power of the central parts of the spinal cord presiding over the vascular innervation.

Dr. Hamilton also looked upon this condition as due to over-irritation of local sympathetic vaso-motor filaments.

One who has the occasion to watch the approach of the blanching of the fingers in one of these cases at once adopts the view of its being due to vaso-motor spasm.

I have been asked to point out the treatment to be adopted in such cases. I must do so in the most general manner possible; it has been various, almost every writer adopting a different plan.

Galvanism, locally, also to the spine, has been quite generally used. Raynaud first advised it. Bromide of potassium, tonics in general, Fowler's solution, potassium iodide, quinine, morphine, internally, when the patient has suffered pain, and the local application of chloroform, have also been used for the same purpose; light bandaging of the part has also appeared to relieve this pain. In cases complicated with diabetes, scleroderma, etc., the treatment indicated is such as is carried out in those conditions.

Other than those cases of Dr. Allan McLane Hamilton, Dr. T. A. McBride, and Dr. C. K. Mills, a case has been reported by Dr. S. C. Clark, of Clayton, N. Y. ("Med. Record," 1885, vol. i, p. 122).

Dr. C. L. Dana, in an article on "Acro-Neurosis," reports two cases ("Med. Record," 1885, vol. ii, p. 57). Dr. Dana, at the end of his article, gives an extended bibliography, and to that I refer those interested for cases other than those mentioned in this brief essay.

A Microscopical Demonstration of Myelitis.—Dr. ALBERT BRINKMAN said the case that he was about to relate in behalf of the microscopical committee presented the ordinary history of myelitis. Nine months ago the patient had complained of some pain in the lower part of his back. Following this, his feet and legs had begun to tingle or feel as if they were asleep, and he had found a loss of power in the lower

extremities. All this had occurred within forty-eight hours and without any assignable cause. There was no history of traumatism, syphilis, rheumatism, or exposure. The spinal column had no abnormal curvature, neither was there tenderness on pressure over any particular vertebræ.

He complained of a feeling as if there were a girdle around the waist. He had no control over the anal sphincter. The urine had to be drawn with a catheter, and gave evidences of cystitis. Priapism had been a prominent symptom in the early part of the attack, but was now lacking.

There was complete loss of sensibility below the lumbar region. The muscles of the legs had atrophied, and their electro-motility and electro-sensibility were very much impaired, showing but slight irritability with a strong current. The passage of a hot sponge along the spine gave no evidences of altered sensibility; the feeling of burning produced by that means, or by using a piece of ice in like manner, as pointed out by Brown-Séquard, was negative. Bed-sores developed, the paralysis extended upward, and the patient died of asthenia.

To look at a spinal cord affected with myelitis, and to distinguish it macroscopically from one possessing normal integrity, was a difficult if not oftentimes an impossible task.

The microscopical examination, however, would soon reveal the dilated blood-vessels, the extravasated red blood-corpuscles, disintegrated nerve-fibers and nerve cells, corpora amylacea, etc. There could be seen the axis-cylinders of some of the nerve-fibers swollen and presenting the varicose appearance called fusiform hypertrophy. The ganglionic bodies would be found swollen, devoid of poles, the nuclei indistinct or absent, and the cells filled with granular matter. Sometimes the ganglia would be about to break up into sections; then again we should find them undergoing atrophy and disappearing.

In order to prepare sections from the spinal cord for the microscope, it was necessary to harden it in Müller's fluid, consisting of potassium bichromate, two parts; sodium sulphate, one part; distilled water, one hundred parts. The process was completed in eight weeks, but might be reduced to eight or ten days if an incubating oven was used maintaining a temperature of 40° C. (104° F.).

Erlitzki's fluid for hardening spinal tissue would answer the same purpose. It had the following proportions: Potassium bichromate, two and a half per cent.; sulphate of copper, one half per cent. Allowing the cord to lie in this for eight to ten days at ordinary temperature would suffice.

Great progress had been made in the methods of staining nerve-tissue by the introduction of Weigert's method. This brought out many points which theoretically should exist, but which it had not been possible to demonstrate with any degree of positiveness before.

Weigert's method was as follows: The sections before being stained must not come in contact with water, but must go directly from the

microtome into alcohol. The staining fluid consisted of hæmatoxylin, one part; alcohol, ten parts; water, ninety parts. This was boiled and allowed to stand for a few days. The staining was best produced at 40° C. in one to two hours; then the sections should be washed in water. The deep black, greatly overstained cuts were then placed in a mixture of ferridcyanide of potassium two and a half parts, borax two parts, water one hundred parts, to remove the greater part of the stain. They remained in this for half an hour to one hour, until the gray matter appeared yellowish, the white substance retaining its dark color. Again the section was washed in water, put into alcohol, cleared up with xylol, and mounted in Canada balsam.

A transverse section of normal spinal cord and one from the case of myelitis were placed under the microscope, and attention was called to the difference in the ganglion-cells. In the normal specimen the nuclei stood out prominently with a clear central nucleolus, and close examination revealed the reticulum. On the other hand, in the pathological condition either there was a loss of the nucleus or it was rendered indistinct. The ganglia had become granular; they might also have lost their poles, and it was positively known that a ganglionic body possessing no poles, the so-called apolar cells of earlier writers, did not exist normally.

The origin of the medullary elements within the ganglionic bodies was given by Beyer as an endogenous growth from the bioplasm of the ganglionic body itself—*i. e.*, first the living matter was increased, giving the coarsely granular appearance. This living matter divided up into angular lumps, separated by a thin layer of fluid which was traversed by delicate conical offshoots, uninterruptedly connecting all the newly formed lumps with one another. Lastly, the whole ganglionic element and its offshoots might break apart into medullary or indifferent corpuscles, which, so long as they remained united by living matter, represented an indifferent medullary or inflammatory tissue. If the uniting offshoots were torn, these elements produced pus corpuscles, and an accumulation of such corpuscles gave rise to abscess. It was true this logic had been applied by Beyer to inflammation in the gray matter of the brain surrounding an abscess, but the same deductions held good in inflammation of the spinal marrow, the tissue being analogous, the difference being not in texture but in situation.

In the normal specimen there was seen a light space around the ganglion-cell; this was the so-called peri-ganglionic space. It was absent in the section of myelitis, but this had no significance, as the space was thought to be artificially produced by shrinkage of the surrounding tissue. In the section of the inflamed cord the blood-vessels were found to be dilated and gorged with blood. The walls of some of the capillaries were thickened at some points and attenuated at others. In the healthy cord this appearance could not be found. The vessels contained very few blood-cells, their caliber was not increased, the walls preserved a uniform thickness, and the neighboring tissue was not infiltrated with the

products of inflammation. In regard to the varicose condition of the axis-cylinders, it could not be seen with the power in use; in order to see it it required an expert and a power of 1,200 diameters.

Chronic Pericarditis Minus Symptoms.—Dr. LEUF presented a heart with its pericardium. The latter was extensively adherent to the heart, in some places by adhesions that were remarkably firm, and others that were easily broken down. In one place about half an ounce of greenish sero-pus had collected between the heart and its membrane, bounded on all sides by old and recent adhesions. In some places the visceral and parietal layers of the pericardium were very much thickened. In this case the disease had not been diagnosticated, and the only excuse for mentioning it was the total absence of symptoms that would call the attention of even alert and experienced diagnosticians to the seat of trouble. There had not been a suspicion of pericarditis in this case. It was instructive as showing the advisability of a thorough examination of all the organs in case of sickness, although attention was not called to them. Pathologists, who were almost proverbially circumspect in making positive diagnoses, were caused to become so by the frequent observance of cases similar to this.

Intestinal Invagination.—Dr. E. H. BARTLEY read the history and presented specimens of a case of intestinal invagination that had resulted fatally.

Meeting of May 6, 1886.

The President, Dr. B. F. WESTBROOK, in the Chair;

Dr. A. H. P. LEUF, Secretary.

A CASE OF DIFFUSE OSTEO-MYELITIS,

WITH REMARKS UPON THE PARASITIC ORIGIN OF THE DISEASE.

BY GEORGE R. FOWLER, M.D.,
SURGEON TO ST. MARY'S GENERAL HOSPITAL, BROOKLYN.

IN bringing to your attention the subject of the parasitic origin of the disease commonly known as osteo-myelitis, I desire to preface my remarks by the history—as yet incomplete, to be sure—of an exceedingly interesting case of the disease, which has been under my observation for the past year and a half in my service at the hospital. I will also exhibit to you the patient and a specimen of the bone removed by operation. The subject of the affection under observation, Eddie B., aged seven, born in the United States, of healthy parents, was admitted to the hospital October 7, 1884, and the following account of the case was derived from his father:

A short time before his admittance the boy stepped upon a nail while at play in the street. The punctured wound, situated at about the center of the plantar surface of the os calcis, was an exquisitely painful one from the beginning, and the family practitioner ordered it to be poulticed, which order was most faithfully carried out; suppuration rapidly supervened, occasioning several spontaneous openings. He had always been a healthy, rosy-cheeked boy, but within a short time after the accident, owing to excessive pain and profuse discharge from the wound, his health rapidly broke down, and he emaciated considerably. His status on admission was as follows: The foot was extensively swollen, ichorous, offensive pus exuding from several apertures. Both elbow joints were swollen and tender, with enlarged veins plainly discernible. At the inner third of the right clavicle and extending to the sterno-clavicular articulation there was found a swelling of the size of a hazel-nut, and at the site of the inner extremity of this an opening having the characteristic appearance of leading to diseased bone. This supposed condition was verified by the probe, and the same state of affairs was found to exist at the bottom of the sinus in the foot. The slightest attempt at moving the elbow joint at once occasioned the most excruciating pain.

On October 22d each elbow joint was punctured with a trocar and cannula, and a small quantity of grumous, purulent material removed. Following the punctures, thorough irrigation with a warm solution of mercuric bichloride was practiced until the irrigating fluid returned clear, after which the punctures were dusted over with iodoform, an antiseptic dressing was applied, and the arm and forearm were supported by angular wire-cloth splints. No reaction followed the invasion of the joints, and the small punctures soon healed.

The right elbow joint showed some improvement after ten days, the left one perhaps rather less. Movements of the arm on either side could be made with less discomfort to the patient.

On December 8th Syme's amputation of the foot was performed, and the sinuses were thoroughly curetted with Volkmann's sharp spoon, the largest sinus being utilized in passing a rubber drainage-tube through the most depending portion of the heel-flap. Much to my surprise, the line of coaptation healed perfectly by first intention, and even the old sinus through which the drainage-tube passed closed rapidly after its withdrawal. No suppuration occurred, and this was attributed to the thorough carrying out of antiseptic precautions in everything pertaining to the treatment of the operation wound. Within three weeks after the removal of the foot the parts had thoroughly healed, and the boy had markedly improved in health. His appetite returned and he gained considerably in weight.

On January 15, 1885, excision of the entire right clavicle was performed. Its periosteum was easily peeled away and the bone lifted from its thickened investment. Here, also, surprisingly rapid healing ensued under antiseptic treatment, union by first intention occurring along the whole line of incision except where the drainage-tube emerged. Prompt closure of the opening occupied by the latter followed its removal. Following these operations the little fellow improved wonderfully in general health, and for a while it seemed as if the disease had spent its force. It was observed that new bone was forming at the site of the removed clavicle; the elbow joints were diminished in size, and seemed more freely movable.

The hopes thus encouraged, however, proved to be delusive, for it was noticed that an enlargement of the remaining clavicle was taking place, and also that the right radius was becoming involved in the disease. The latter soon presented a decidedly fusiform enlargement, and several openings appeared.

On July 13th an incision was made down to the left clavicle, which was found to be the seat of a central necrosis. An opening which was discovered leading down to a loosened sequestrum was enlarged, and the latter removed. The cavity was thoroughly curetted, washed out with a mercuric-bichloride solution, insufflated with iodoform, a drainage-tube inserted, and a dressing applied in the usual way. Suppuration followed, but this finally ceased, and in about three weeks the wound closed.

On September 14th the operation for the excision of the entire radius was performed. A long incision was made on the radial border of the arm, somewhat inclined to its posterior surface, in order to connect, two large sinuses, the one near the head of the radius, and the other at the lower end near the radio-carpal articulation. The bone was sawn across in the middle of the shaft, and each portion removed separately. The head of the bone was found to be loosely attached to the soft tissue, and detached from the shaft and removed separately. The lower epiphysis was likewise found to be detached, and, as the portion of bone adjacent to the epiphyseal line looked comparatively healthy, it was determined to leave this fragment *in situ*. Some difficulty was experienced in thoroughly curetting the lining of the larger sinuses, for the reason that both approximated important articulations, and it was deemed important not to open into the latter. Some suppuration followed the operation, and union only took place in about one half, in the aggregate, of the line of incision. This was attributed, in part, to the circumstance just mentioned, and the fact that some irritation and excoriation ensued, due, doubtless, to a profuse use of pure hydronaphthol along the line of incision. Complete union, however, finally occurred, the case after the third day pursuing an apyretic course. This arm soon became decidedly the more useful of the two members.

Following the excision of the radius and the operation upon the left clavicle the patient again improved, the improvement being the subject of general remark.

Again it was thought that the case was in a fair way to cease making clinical history, and again these hopes failed of realization. The right ulna and humerus now became the seat of infiltration and deposit, and sinuses formed leading down to diseased bone at the upper end of the forearm and the middle of the shaft of the humerus. Simultaneously the left half of the body of the inferior maxilla and the right superior maxilla became involved. An attempt was made to eradicate the disease in connection with the right humerus and right ulna by chiseling a groove in the bone and scraping the medullary cavity for a considerable distance above and below the seat of disease. These operations, however, proved to be of no avail, and the sinuses marking the site of the disease in these localities remain as before. In the mean while fresh evidences of the activity of the morbid process underlying this persistent and successive involvement of bone-tissue were afforded by a swelling over the sternum, which rapidly ulcerated, and an enlargement of the skull over the anterior fontanelle. The case was manifestly a hopeless one, and further operative treatment was abandoned.

In October, 1885, Dr. Hermann Biggs, instructor in the Carnegie Laboratory, visited the hospital, upon my invitation, for the purpose of obtaining, if possible, cultivations of whatever micro-organisms might be found in the discharges of the sinuses of this case. The cultivating medium employed in this case was sterilized gelatin kept in glass tubes,

their openings being tightly closed by cotton plugs. A fine platinum needle was first sterilized by being passed through the flame of a spirit-lamp, and subsequently plunged into the bottom of two of the deepest sinuses. The cotton plug of one of the tubes was rapidly removed and the platinum needle, covered with the secretion of the diseased bone, quickly passed into the gelatin contained in the tube, the needle withdrawn, and the cotton plug instantly replaced. This manipulation was repeated several times till a number of tubes were thus charged. The propagation of the germs was carried on in the Carnegie Laboratory, and the following is the substance of the report furnished by Dr. Biggs: Owing to the unfavorable surroundings and the fact that the secretions had been exposed to the air, a majority of the cultivation-tubes became infected with germs from the latter, and hence were worthless. Two of the number, however, proved to be pure cultivations of micrococci. These latter were of two species, the first being the *Staphylococcus pyogenes albus*, and the second the *Staphylococcus pyogenes aureus*.

It has long been a matter of observation among surgeons that, excluding from consideration cases of osteo-myelitis complicating fractures and following amputation, most cases of the disease occur during the earlier period of life, while the skeleton is yet in the process of development. A predisposition to inflammatory changes seems to be inherent in the young bone, during the period of physiological growth. The fact that in the majority of cases of acute and chronic osteo-myelitis the changes in the youngest medullary tissue, or that lying adjacent to the disc of epiphyseal cartilage, gives substantial support to the acceptation of this view. Further than this, and aside from such general predisposition, the question naturally arises as to the exciting or special cause or causes of the peculiar changes which the medullary substance undergoes in this affection. In other words, have we here, as elsewhere, to deal with an agency which may be specific in character, such as pathogenic germs, and, if this can be answered in the affirmative, what is the method of their propagation, and in what manner do they find entrance into the tissue?

Numerous accurate observations have been made upon subjects dead of this disease, and both Lücke and von Recklinghausen have succeeded in removing portions of the contents of diseased medullary cavities without allowing them to come in contact with the atmospheric air. In these have been demonstrated, and from them developed, both cocci and bacilli. Their presence in these closed cavities can only be accounted for upon the supposition that they have been carried into the medullary tissue by the blood-current, and that they

have their origin in some portion of the body where foci of infection have resulted from previous infection, through the medium of the mucous membrane of the respiratory or digestive tract. The clinical facts seem to agree with the theory that the mucous membrane just named may be the medium of infection, and it may also be pointed out that the mucous membrane does not always escape the effects of the presence of these micro-organisms, for authenticated instances are known where bronchitis and enteritis have preceded the development of osteo-myelitis (Kocher).

That suppurative disease of the medullary structure is due to the presence of some parasite requires but little argument beyond the simple allusion to the experiments of Ogston upon the causes of suppuration in general, and particularly to that portion of his observations relating to the presence of micrococci in the pus of abscesses previously unopened, to place this theory upon a sound basis. Pasteur, in 1880, had found in a furuncle a micrococcus corresponding to that of Ogston, and likewise in pus from suppurating inflammation of the medullary cavity of bone—viz., osteo-myelitis. Pasteur's researches were not directed particularly to the study of osteo-myelitis; hence his conclusions may be said to be based upon insufficient observation regarding this particular disease, he having examined but one case. In this, however, the broken-down medullary substance as well as the pus was literally swarming with micro-organisms. In the following year, however, Schüller confirmed Pasteur's observation in relation to the presence of micro-organisms found in previously closed medullary cavities of bone, the subject of suppurative inflammation.

To Kocher, of Berne, however, belongs the credit of having first attempted, in a systematic manner, aided by experiment, to establish the parasitic origin of osteo-myelitis. In the first place, it was established by this observer that the injection of caustics and substances of an irritant nature generally into the medullary canal of bones of dogs did not, when performed antiseptically, produce osteo-myelitis. No suppuration followed, and whatever irritation and subsequent inflammation occurred led only to a general hardening or sclerosis at the site of inflammation. The next experiment consisted in injecting putrid fluids into the medullary cavity of bone in animals, when in some instances, yet not in all, osteo-myelitis followed. The materials employed were not derived from pure cultivations, but had putrified in closed vessels, and were found by Kocher to contain principally a long form of bacilli, bearing spores at their extremities.

This experimenter seems to have arrived at the conclusion that the disease depended upon the presence of spore-bearing or other micro-organisms identical with agents producing putrefaction. He gives no definite description and attempts no classification of the organisms which he found in the pus resulting from osteo-myelitis produced in his trial-animals. In the light of investigations by later observers, and from the fact, as before stated, that Kocher did not employ pure cultivations, but simply putrid material which had solely been protected from the access of oxygen, and, in addition to these, the only occasional occurrence of osteo-myelitis, it is fair to assume that some of his injections contained pathogenic germs purely accidentally. These pathogenic germs may have been few in number, for, even in cases where the injections were not entirely innocuous, a genuine osteo-myelitis did not follow. The successfully inoculated cases showed considerable diversity likewise as regards intensity. The conclusions of Kocher, although not decisive, are still very suggestive, and may lead the way to a more elaborate study of the disease.

In one of the latest contributions upon the subject of micro-organisms and their relation to wound infection, that by Rosenbach, of Göttingen, the *Staphylococcus pyogenes aureus* is viewed as being, in all probability, the special agent in the production of acute infectious osteo-myelitis, although the *Staphylococcus pyogenes albus* was also found by both Rosenbach and Garié, the latter observer describing it as coursing in the blood. This fact is of special significance, and interesting in connection with the circumstance that septicæmia is not an infrequent complication of acute osteo-myelitis. These organisms, injected into the pleura or knee of a rabbit, produce, as a rule, a fatal result within twenty-four hours. This was particularly true of the orange-yellow variety. If the latter be injected into the knee of a dog, suppuration and rapid disintegration of the joint follow. The staphylococci are not identical with any of the known forms causing putrefaction, and, indeed, it has been shown that in pus, when alone present, they do not cause any septic odor. Besides being invariably present in acute osteo-myelitis, they have been found in the pus of boils and abscesses of pyæmia, and also in puerperal fever. The most deadly effects follow upon their injection into the jugular vein of animals. They seem to have an elective affinity, so to speak, for any inflammatory condition in and about bones. It was found that if a small quantity of a cultivation was introduced into the jugular vein of an animal after previous fracture or contu-

sion of a long bone, the animal perished in about forty-eight hours, and abscesses were found in and about the bones at the seat of injury and, in some cases, in the lung and kidney. The blood was also shown to contain similar cocci.

In view of the facts as here presented, and which are believed to represent our present state of knowledge upon the subject, the explanation of the *modus operandi* of these organisms in the production of osteo-myelitis appears to be somewhat as follows: It is believed that the micrococci find an entrance into the system at first by means of an accidental lodgment upon an abraded mucous membrane, a solution of continuity of the integument, or wounds of the soft parts. As before stated, the first infection upon a mucous membrane may give rise to an inflammation of the same—this, of course, preceding the development of the bone lesions. It is believed that the spores or germs are first arrested at some point where a more or less temporary stasis occurs, and that here, by their influence upon the corpuscles, causing the latter to adhere, they form thrombi from which fragments may be torn off by the blood-current and carried along until caught in some vessel too small to permit of their passage. Should these embolic masses lodge in the localities which will furnish the best pabulum for the growth and development of their contained cocci—such, for instance, as the young marrow adjoining the epiphysis of a long bone—they grow rapidly after lodgment in these vessels. Or, without the formation of thrombi or the intervention of emboli, the micrococci may be carried directly by the blood-stream until arrested in the locality just mentioned, there forming a colony of their kind, the presence of which is made manifest by their characteristic effects in the production of tissue-changes. In the case of the micrococci of Rosenbach, the *Staphylococcus pyogenes aureus* and *Staphylococcus pyogenes albus*, there seems to be an especial tendency to development in the medullary structure, and perhaps this occurs with greater facility in the youngest portion of this tissue, or that which lies adjacent to the epiphyseal cartilage. The delicate network of vessels lying in the cancellous tissue becomes easily blocked, as well as the vessels of the medulla, and here the micrococci become arrested and find the pabulum, in the highly nutrient medullary tissue, most favorable for their development. An endostitis quickly results from the presence of the growth of parasites, and suppuration follows. The ordinary changes of osteitis, with or without necrosis, now follow. Sometimes the inner shell of bone becomes separated from the outer portion and a sequestrum is formed,

although the disease more frequently confines itself to the medullary canal and affects this in its entire length.

Cases of apparent spontaneous origin of this disease, without abrasion or traumatism of any kind preceding the development of the bone disease, like the cases of so-called spontaneous pyæmia, only seem to strengthen the clinical evidence of the bacterial origin of these septic diseases. Perhaps a closer scrutiny of these cases of supposed spontaneous pyæmia would reveal a source of infection. I recall a fatal case in my own practice in which a suppurative disease of the antrum proved to be the focus of infection, and Weichselbaum has reported a similar case. At all events, the metastatic abscesses of pyæmia always contain bacteria, and, in every instance of osteomyelitis in which search has been made, the staphylococcus in one or the other of its varieties has been found. In the majority of instances it is the orange-yellow variety that has been found constantly present. In a few exceptional instances the white variety was present alone.

For the cultivation tubes of the staphylococcus, and the beautiful microscopical mountings of the same, I am indebted to Dr. Hermann M. Biggs, of the Carnegie Laboratory, who has kindly placed them at my disposal for the purposes of this paper.

The Microscope in Diagnosis.—Dr. Frank Ferguson, of New York, read a paper on this subject. [It was not furnished for publication.]

Meeting of May 13, 1886.

The President, Dr. B. F. WESTBROOK, in the Chair.

Dr. A. H. P. LEUF, Secretary.

Foreign Body in the Rectum.--A specimen was presented by Dr. S. HENDRICKSON, who said that, as the patient from whom it was removed was not his, he was unable to furnish a complete history of the case. It was shown to the society for the purpose of gaining information as to its nature, its appearance being different from anything previously observed by him in alvine discharges. The subject was a lady, about fifty-five years of age, of spare habit and a very small eater. The speaker understood that she had been in rather delicate health for several years, and had been annoyed by a feeling as if of something moving in the stomach and upper bowels, and there had been occasionally some pain. She had frequently taken cathartic medicine. Recently her physician, with the idea that it might be a case of tape-worm, had given her a teaspoonful of the oil of male fern, which caused the passage of the material shown in the specimen. The appearance of the specimen was that of irregular shreds of skin of varying thickness, such as are frequently voided in cases of intestinal worms. An interesting feature in the specimen shown was that clusters of elongated, spindle-shaped bodies of regular form, and from one quarter to three eighths of an inch in length, were growing out from various portions of the muco-fibrinous masses. These clusters were translucent, and resembled the cells of orange pulp, except in their attachment, and also in being more pointed at the distal end. A careful microscopical examination of them had not been made, but macroscopically they seemed to be surrounded by a capsule, to be without a nucleus, and to have a somewhat regular striated structure internally. The speaker regarded them as some variety of vegetable parasite.

Dr. A. H. P. LEUF referred to a similar specimen that he had presented to the society on a previous occasion. It had been sent to him for diagnosis from Fort Laramie, Dakota, and came from the rectum of a female patient who had suffered from a rectal disease for a period of two years. It had been removed while the patient was under the influence of an anæsthetic, and it was rolled up like a cylinder. Various opinions as to its character had been offered by members of the society, some suggesting that it was fish skin. Careful examination, however, had shown it to be the framework of an orange or a lemon. The speaker suggested that Dr. Hendrickson's specimen might be of the same nature.

The specimen was referred to the Committee on Microscopy, who, at a subsequent meeting, reported that it was the stroma and framework of a tropical fruit belonging to the lemon family.

A Convenient Form for Administering Paraldehyde.—Dr. R. G. Eccles said that, after considerable experimentation, he had determined upon the following as being the least disagreeable way of administering paraldehyde:

℞ Paraldehyde,
Almond-oil.....each, ʒ ij;
Chloroform..... ♏ x;
Oil of cinnamon..... ♏ ij.

One half to be taken at bedtime, and the remainder during the night, if required. He said that it agreed with the stomach, and would often settle one that was unsettled. It could be taken undiluted.

Meeting of June 10, 1886.

The President, Dr. B. F. WESTBROOK, in the Chair;

Dr. A. H. P. LEUF, Secretary.

Notes of a Case of Submucous Fibroid of the Uterus.—Dr. A. H. BUCKMASTER reported the following case:

Mrs. S., forty-four years of age, had maintained good health since the birth of her last child, sixteen years ago, until within a short time of her death. A few months ago she noticed a lump in her abdomen above the symphysis, and in the median line. She flowed more freely after the discovery of the tumor. Four months before her death she flowed profusely, and it was on account of the weakness incident to the loss of blood that she sought medical aid. Her appearance attested her statement of severe hæmorrhage. She presented the white lips and yellowish-white skin supposed to be indicative of malignant disease, but accompanying so many conditions associated with blood impoverishment. Physical examination revealed the fact that the uterus was enlarged to the size of a cocoanut; the os was slightly dilated; and the diagnosis of a submucous fibroid was made. It was determined to build the patient up by careful attention to diet and personal hygiene as soon as possible, secure full dilatation of the cervix, and remove the mass. Dilatation was accomplished by the introduction of the tip of the forefinger into the os, holding it there and pushing gently for ten or fifteen minutes. This was repeated every day, and after the fifth or sixth time the forefinger could find an easy entrance, and a thorough exploration of the uterine cavity was accomplished. It then became evident that the growth was attached by a very broad base to the upper half of the uterus. A few days after full dilatation was secured, the patient died suddenly from cerebral apoplexy, and to this circumstance was due the opportunity of examining a very interesting specimen.

The difficulties of diagnosis in these cases were slight, but their proper treatment required much skill. While fibroids were in themselves innocuous, yet by causing displacement by their weight, by interfering with the functions of the pelvic and abdominal organs by their size, and by causing a dangerous anæmia from the constant drain of blood which so frequently was the only symptom of their presence, they became of great interest, and consideration of the best method for their removal assumed the utmost importance.

The speaker had hoped to demonstrate in the specimen presented a practical point concerned in its removal, but the alcohol had so changed the condition of the tissues that it was impossible. When the specimen was examined in the recent state, it was found that the weight of the fibroid had caused an invagination of the uterine wall as shown in the

accompanying illustration. By this it might be seen there were two sulci, one representing the line of detachment between the fibroid and the uterine wall, the other but a fold in the uterine wall. If a cutting instru-

ment were used to enucleate the tumor, it would be the easiest thing in the world to stray into the wrong opening and cut through the uterus. A number of distinguished gynæcologists had met with this sad accident, and the care required when sharp instruments were used was generally recognized.

The speaker said that he would have to ask the society's credulity on another point. The connective tissue between the fibroid and its uterine attachment could easily be broken down with the finger. He thought the tumor would have separated spontaneously had the woman lived a few weeks longer, and, if some ardent investigator had been using ergot, an excellent case would have spoken in favor of this dangerous remedy. No cutting instrument of any nature was needed, and, where the finger would not reach, a dull curette, or a Hunter's or Sims's depressor, would have answered the purpose admirably.

Yet another point of interest was in relation to the softening of the cervix. When the patient was first seen there was a large mass in the uterus, yet there had been no pains indicating any long-continued uterine effort. The irritation produced by the finger established this effort and the softening and dilatation *pari passu*. It was probable that, as the fibroid was protruded from the wall, there were attempts at expulsion, but, as the adhesions were too strong to permit this, the uterus became reconciled to its guest, and remained quiet until the treatment to produce dilatation commenced.

The speaker acknowledged the kindness of Dr. T. G. Thomas in regard to the publication of this case, which occurred in his service at the Woman's Hospital.

Dr. Thallon was reminded of a case he saw two years ago with a more happy termination. He found the patient in pain and with a mass protruding from the vulva. He considered it a submucous fibroid. He gave in repeated doses 40 minims of Magendie's solution, but without relief. The patient was a maiden lady forty years of age. He attempted

to encircle the tumor, but it was so tightly impacted in the vagina that not even a silver probe could be passed between it and the vaginal wall. She was taken to the Long Island College Hospital, where she was operated upon by Dr. Skene. Even while the patient was anæsthetized it was not possible to encircle the growth. A V-shaped cut was made in its base and it was thoroughly gouged out. There was much hæmorrhage. The incision was closed and the écraseur applied. The pedicle was smaller than in Dr. Buckmaster's case. The tumor was so large, though, that it had to be taken out in sections. The uterus was so completely open after the removal of the growth that one could see the openings of the Fallopian tubes. The case had not been reported. It was the largest tumor he had ever seen removed *per vaginam.*

Dr. JONES inquired if any bad results followed Dr. Buckmaster's efforts at diagnosis.

Dr. BUCKMASTER did not think the dilatation caused death; that was due to apoplexy. As soon as dilatation was begun the uterus commenced to contract.

Cancer of the Uterus, Lungs, and Liver.—Dr. H. D. BLISS related the history of the case of Elizabeth H. M., forty-six years of age, English, married. She had had one child at term and one miscarriage. Her family history was good so far as was known, though exact information could not be obtained. The patient's own health had been good up to eleven years ago; she had been under treatment for ten years, and had considered herself an invalid for upward of nine years. She had been troubled with anasarca for a number of years, and had been tapped several times. She was again tapped while in the City Hospital in the early part of the year.

The following records were furnished by Dr. F. C. Raynor, house physician of the City Hospital:

January 22, 1886.—Patient has been sick since the middle of September; was first taken with cramps. On the 2d of November took to her bed, and had a severe attack of peritonitis. Was treated by a doctor who did not believe in giving opium. Directly following this attack the abdominal cavity began to fill with fluid, and is now markedly distended. Complains of great pain about the heart, can not retain food, and is in a very uncomfortable condition, as she has to sit propped in bed.

Treatment.—Infusion of digitalis, acetate of potassium, with a cathartic at night.

24th.—No special change. Had free movement, which relieved tension somewhat. Urine quite free. Tube-casts but no albumin.

25th.—Tapped patient this morning, and drew off fourteen quarts of fluid. Stood the operation very well and seems much relieved.

26th.—Pain in abdomen very severe this morning; is markedly tympanitic. Applied hot turpentine stupes and gave ♏ iij internally, with but little effect.

February 2d.—Can not retain food; unable to relieve the tympanites. The pain is severe at times.

10th.—Seems much improved, retains food well, says she feels stronger, but is still markedly tympanitic.

20th.—Not as well. Discovered a hard mass in the left iliac region which is tender to the touch.

March 1st.—From past history thought the bowels were loaded with fæces; gave ℥ j castor-oil in emulsion. This produced enormous evacuations. Repeated the dose at night.

2d.—Has had several movements since yesterday and feels decidedly relieved. Her stomach is very troublesome; vomits frequently. Put on the use of peptonized milk.

31st.—Laxatives have been used almost continuously. Has markedly improved; appetite good and eats everything now with relish. The ascites still marked, but does not seem to increase.

April 20th.—Drew off eight quarts and a half of clear serum with a trocar introduced in the median line. Patient felt much relieved afterward.

21st.—Patient appears brighter than usual this morning. Made a careful bimanual examination to-day and found a large, hard tumor filling nearly half the pelvis on the left side. The mass is connected with the uterus, the os being pushed over to the left, the vagina nearly occluded, the bladder very small, and the rectum somewhat encroached upon. There is also a small, hard, subcutaneous tumor in the right axilla with processes running out from it.

24th.—Takes her discharge.

On admission to St. John's Hospital, May 15, 1886, she was suffering from general anasarca and dyspnœa. The pulse was rapid and feeble; temperature normal; urine scanty, high colored, and slightly albuminous; mental faculties dulled, and a very accurate history not to be obtained. On account of distension of the abdominal walls, palpation revealed but little more than nodular masses with slight tenderness in the right hypochondriac and left iliac regions. There was absence of respiration over the entire right lung, with complete flatness except at the apex, where it was thought there might be a cavity. There was flatness over the left lung at the base. The apex-beat of the heart was slightly above its normal position.

Dr. Skerry, house physician at St. John's, furnished the following condensed notes:

Treatment.—Infusion of digitalis, aromatic spirit of ammonia, tincture of chloride of iron.

May 18th.—On account of oppression, the patient was aspirated; seventy-six ounces drawn off in sixty-five minutes. There was some shock. Stimulants were given. Pain was experienced in the hepatic region and in the left iliac fossa, and a nodular mass is more easily felt in the latter locality.

19th.—Uneasiness is felt, caused by nausea and flatus. Bowels moved with difficulty by enema of ox-gall, oil, soap-suds, etc. Patient free from pain but restless.

20th.—Severe pain in iliac fossa. Pulse 140 and weak.

26th.—Aspiration again necessary, one hundred and twenty-four ounces being

drawn off in seven hours, by capillary needle. No shock. Patient slept. Bowels moved by castor-oil.

28th.—Seventy-two ounces of fluid drawn off by capillary aspiration. Patient more easy.

June 2d.—Uneasy, very weak, crying out at times. Again filling up. Temperature normal. Pulse 146 and weak.

6th.—Sinking rapidly. No pain, but restless. One hundred and forty ounces of fluid drawn off. Desires solid food.

9th.—Gradually sank until she died at 4 P. M. Was comatose six hours before death.

Necropsy.—The body was of a sallow or pale-yellow color; not much emaciated. The abdomen greatly distended. A straw-colored fluid escaped from the mouth and nose. On making the long incision and opening into the cavity of the abdomen, large amounts of fluid escaped. The same thing occurred in the thoracic cavity on removing the sternum. The entire right cavity of the thorax was filled with fluid, the lung occupying a space not larger than one's fist, having no crepitation, being nearly a solid mass. The left lung was of about two thirds its normal size, being bound down by adhesions, the remainder of the cavity being occupied with fluid. The pericardium was only slightly out of its normal position, and contained about two teaspoonfuls of fluid. The heart was of proper size, the valves all closed normally, and, so far as noted, it was the only perfect organ in the body.

Abdomen.—The omentum was covered with numbers of gray nodules, from the size of a small pea to that of small marbles—probably one hundred and fifty to two hundred. The uterus was greatly enlarged, the fundus measuring about four inches across, turned to the left, and firmly bound down by adhesions to the rectum behind, to the bladder in front, and to the pelvic walls. In fact, all the pelvic organs were a solid mass so firmly united that it was impossible to separate them without tearing. The liver, slightly enlarged, contained from twenty to twenty-five steel-gray nodules of varying size, from that of a hen's egg to that of a goose's egg, and larger. The spleen was quite enlarged, and contained similar nodules, as did also the pancreas. There were pea-sized nodules on various parts of the intestines.

Kidneys.—The capsule was thickened, and easily stripped from the kidneys. Between the capsule and the kidney were a number of cysts. The cortical and medullary substance of the kidneys appeared, upon macroscopical examination, to be normal, and were not submitted for microscopical examination. Forty-eight quarts of fluid were removed from the body.

The following is the report submitted by the Microscopical Committee:

At a previous meeting of the society several specimens were referred to the Microscopical Committee. Among them were carcinoma of the uterus, liver, lungs, and spleen, all removed from the body of one patient.

I have the pleasure of presenting sections of these organs illustrating the varieties of carcinoma, and demonstrating the infiltration of the different structures, displacing or replacing the normal cells to such an extent that, without having seen the tissues from which they were taken, it would be impossible to say

whether a specimen was cancer of the uterus, liver, or lung, the microscopical appearance simply showing the cancer elements to the exclusion of all other cells.

It is probable that in this case the morbid growth first originated in the uterus and secondarily invaded the other organs by propagation along the vessels and lymphatics, the lung being very rarely the seat of primary cancer, and the liver seldom, if ever, when consisting of multiple nodules, as in this instance.

It will be sufficient to describe a section from the liver, as the type of secondary cancer generally conforms to that of the primary growth. In this case all the specimens are of the scirrhous or hard variety. On looking through the microscope at the section of liver, instead of finding the normal liver cell we see a large amount of fibrous connective tissue, throughout which are scattered cells—some round, some fusiform, and others irregular polygonal. On moving the slide, spaces can be found where there is still partially transformed liver tissue, with liver cells in all stages of disintegration, dwindling away from the pressure exerted by the malignant growth.

In the uterine growth is found a similar abundance of fibrous tissue, with the same variety of cells. As no section was made to include the mucous membrane lining the uterus, no evidence of cancerous degeneration of the glands can be demonstrated. Scirrhus of the uterus is pronounced a very rare form of cancer and its existence is denied by some authors; others hold that in all probability the primary condition is scirrhus, which, after a variable time, is converted into medullary by a proliferation of cells bursting the framework of the alveoli and forming large, soft masses. In the lung, the scirrhus has obliterated all traces of lung tissue. Pulmonary carcinoma is secondary to cancer of some other organ. It generally invades the pleura, studding this with nodules, and is accompanied by hydrothorax, as in this case. Comparing the scirrhus of the various organs, the appearances are identical, rendering it necessary to seek the particular structure to tell which is uterus, which liver, etc. Looking at the cancerous portions alone, differential diagnosis is impossible.

A. Brinkman, M. D.

The speaker said that there was here given somewhat in detail the history of a case of cancer probably of several years' standing, and, although it had been seen by a large number of competent physicians, yet, so far as was known, an accurate diagnosis had never been made ante mortem. There was a history of repeated attacks of peritonitis; but there was an absence of the local symptoms which were supposed to accompany cancer of the uterus, though this lack of symptoms might be accounted for by its being at the fundus and of the scirrhous variety. Another point that might be worthy of notice was that, although the patient was troubled with nausea and difficulty of retaining food on the stomach, yet, on section of the mucous lining of the stomach, it appeared normal, and the body was not emaciated, showing there had been good assimilation of food. The amount of suppuration, considering the size of the wound and the large cavity left by the enucleation of the axillary glands, had been surprisingly small. Bichloride of mercury—in a 1-to-15,000 solution—was used in the operation for sponging, washing the hands, instruments, etc., etc. The patient's mother and aunt had

both had the breast removed for cancer, the former, as was ascertained, with a fatal result. The family history otherwise was good.

Scirrhus of the Breast.—Dr. HENRY N. READ presented a specimen which had been removed from a widow thirty-two years of age. The patient had had one child ten years ago, and three miscarriages since. She had been a widow three years. Last Christmas she had first noticed a small, painless nodule in the lower part of the right breast. She had attributed it to injury received in her housework. No particular notice had been taken of it at first. The lump had grown rapidly, and after two months from its first appearance had begun to be painful, the pains being lancinating and shooting in character, gradually increasing in severity. About the 1st of April the skin had gradually become attached to the tumor, which before had been movable underneath. The glands of the axilla had then become involved; the pain had increased so much that the patient's sleep had been frequently interrupted.

The case was first seen by the speaker on the 10th of May, and a diagnosis was made of scirrhous cancer, and an immediate operation for its removal was advised. Dr. Rockwell was invited to see the patient, and confirmed the diagnosis and coincided in the advice for immediate removal. The operation was performed on the 19th of May with the assistance of Dr. Bartley, Dr. Skerry, and Dr. Hutchinson, and the entire breast was removed. The tumor was found movable, involving probably a third of the gland tissue, the skin adherent and the nipple retracted. Considerable hæmorrhage occurred, owing to the large size of the nutrient arteries and to the plethoric condition of the patient. The axillary glands were found much infiltrated and were all removed, together with the chain of lymphatics under the folding border of the great pectoral muscle. This part of the procedure was quite tedious and two hours were consumed in the operation. The patient being a large, fat woman, and the bosom correspondingly large, the removal of the entire breast left an enormous wound, which was closed with twenty-four stitches, and drained at the lower angle. Support was given by adhesive plaster and the parts were dressed with carbolized vaseline and marine lint. Union by first intention took place in the greater part of the wound, and at the time the report was made the opening had healed, except a portion about an inch and a half in length, and the patient was walking about the house with her arm in a sling. No shock and but little pain had followed the operation.

The following paper was then read:

THE PATHOLOGY OF THE LYMPHATIC GLANDS IN CHILDREN.

By HENRY N. READ, M. D.,

PROFESSOR OF THE DISEASES OF CHILDREN IN, AND PHYSICIAN TO, THE LONG ISLAND COLLEGE HOSPITAL; PHYSICIAN TO THE SHELTERING ARMS NURSERY, BROOKLYN.

The lymphatic, or second circulation, as it has been sometimes called, is exceedingly active in young life—much more so than in adult years. The processes of digestion, assimilation, and elimination, being carried on with such activity in the young, compel a corresponding activity in all the processes contributing to these, of which the lymphatic circulation plays a most important part. The lymphatic glands are relatively larger in children than in those of mature years, and are much more active, and the quantity of lymph circulating is absolutely larger. The great size of the thymus gland and thyreoid body in infancy, as compared with adult life, is well known. The spleen only, forming an exception to the general rule, though growing very rapidly in infancy, is smaller, both absolutely and relatively, in the young than in the old. The lymphatic system, therefore, being prominent in the young, is especially liable to disease; and lymphatic disease, with some notable exceptions, is a disease of infancy and childhood. The functions of the lymphatic system being, in part at least, to aid in nutrition by the production of leucocytes, and by the depuration of the tissues, it would seem *a priori* that lesions of this part of the economy would show themselves by vitiated nutrition, wasting diseases, general anæmia, and atrophy, and such, indeed, is the case.

The general lymphatic system consists of the lymphatic vessels and certain glandular bodies scattered more or less thickly throughout the body. The office of the lymphatic vessels being to carry the lymph, which may be designated as "blood minus the red corpuscles," into the general circulation, these vessels are composed, like arteries and veins, of three coats—an internal epithelial, a middle muscular, and an external areolar fibrous. They are also provided with valves, like the veins. They originate in several ways, one mode of origin being by a plexiform network in the subcutaneous and submucous tissues. They also arise from closed extremities, as in the lacteals of the digestive tract. Again, the lymph sinuses or tracts in the lymphatic glands, and the lymphoid tissue found in various organs of the body, serve as modes of origin, and finally they

arise from openings or stomata between the epithelial cells of serous cavities, whereby these cavities communicate directly with the lymphatic system, and may be regarded as closed lymph-sacs. The lymphatic vessels entering the lymphatic glands are called afferent, and are usually several in number. The vessels leaving the glands are called efferent, and number but one or two. The lymphatic glands are composed of a fibrous capsule, from which a framework of trabeculæ, or processes, proceeds inward, dividing the gland into open spaces called alveoli, which communicate freely with each other. A large quantity of retiform tissue fills these alveoli, and numerous blood-vessels run along the trabeculæ. The alveoli are filled with retiform tissue or gland-pulp, the external part, called cortical, being light in color, while the interior or medullary is dark. In the cortical portion the retiform tissue is arranged in the form of nodules, from which rods or tubes proceed, interlacing with each other in a very minute network, forming by this arrangement the medullary portion of the gland. Both the nodules and rods are attached to the trabeculæ and held in place by a delicate connective tissue. The afferent lymphatic vessels open directly into the lymph-path or lymph-channel around the nodes and rods. This investing space is continuous over both the nodules of the cortical and the tubes of the medullary portion of the gland, and the efferent vessels are continuous with it in the latter portion. It is in these spaces that the exchange of materials goes on between the blood-vessels and the lymphatics which is necessary to the further elaboration of the lymph and the multiplication of the lymph corpuscles which takes place in the gland. The course of the lymphatic circulation is the reverse of the sanguineous, being from the extremities to the central organs, and Kölliker states that at first the lymph is a mere albuminous fluid, and the chyle an albumino-fatty fluid, the cells in both cases being produced by the passage of the fluid through the glands, lymphatic or mesenteric, as the case may be, and being further elaborated in the course of the circulation.

The most common form of disease in the lymphatic system of children is simple adenitis or gland-inflammation. In those subjects in whom it occurs unconnected with any of the diathetic or inherited diseases there are present in the glands only the ordinary phenomena of inflammation, induration, swelling, pain, etc. Resolution or suppuration may take place, and in either case there is an end of the trouble, the disease not being dangerous. It should be borne in mind, however, that young children, even though healthy

and entirely untainted with either tubercle, scrofula, syphilis, or rhachitis, are exceedingly liable to the development of adenitis. Many of the ordinary diseases of children produce induration of the superficial glands, as also do cold, teething, bruises, burns, and especially the various eruptions of the skin, notably eczema of the face and scalp. Errors of diagnosis may occur in supposing children affected with eczema capitis (either acute or chronic) scrofulous, on account of the extensive enlargement and induration of the sub-occipital, post-cervical, and submaxillary lymphatic glands. On the cure of the eruption, however, if the patient is not strumous, the enlarged glands will disappear; or, if suppuration takes place, it will be limited to one or two glands. In the field of observation touched upon in this article, the four great diathetic diseases of childhood—viz., syphilis, rhachitis, scrofula, and tuberculosis—offer the most marked and important changes in the lymphatic system. Space and time forbid any extended treatment of these important affections, and I shall limit myself to simply calling attention to some of the most important changes in the absorbent system wrought by the diatheses mentioned. Whether the lymphatics are primarily affected in these diseases, or become affected with other tissues in the subsequent course of the morbid changes, can not be proved, but that their perverted function soon shows itself through the system, in its own peculiar way, is readily seen. The alterations in the lymphatic glands are probably less extensive, and certainly much less dangerous, in syphilis and rhachitis than in struma and tuberculosis.

Congenital syphilis is a specific poison obtained in the child by inheritance from one or both parents. It presents the following symptoms in the infant:

Anæmia, Atrophy, Malnutrition,	Common to all the diathetic diseases.
Certain eruptions of the skin, Certain lesions of the mucous membranes, Certain diseases of the bones, Certain affections of the glandular system,	Peculiar to this disease alone.

The poison of syphilis, as is well known, has a peculiar affinity for the glandular system, and the lymphatics, as part and parcel of this apparatus, come in for their share. In the syphilitic child, therefore, we find all the superficial lymphatic glands enlarged and indurated. The most obvious and presentable are the inguinal and

post-cervical. The axillary, suboccipital, supra-condyloid, and other less important glands, however, can be felt on search—in size from a millet-seed up to that of a bean—and are noticeable for their hardness. The internal or deep-seated glands are also enlarged, and may produce some functional derangement by pressure on neighboring parts. The thymus gland is much enlarged, and frequently suppurates, though it is doubtful whether the syphilitic poison causes this change. The spleen is now regarded by the later authorities as belonging to the lymphatic glandular system, and its behavior in congenital syphilis strongly supports this view. The researches of Gee, Barlow, Hirschfeld, and others render it probable that the spleen is enlarged in nearly all cases of inherited syphilis, the degree of the hypertrophy being dependent upon the severity of the disease. The enlargement is due to simple hyperæmia, or at the most hyperplasia, no new growth or other changes taking place. It is slow, persistent, and painless, unaccompanied by inflammatory changes or any breaking down of tissue, subsiding slowly under specific treatment, and acting very much as ordinary buboes do in acquired syphilis. It may be remarked, finally, in connection with this part of the subject, and what is of importance to remember in making diagnoses, that the lymphatic glands have a harder and more indurated feeling to the touch in congenital syphilis than in the other diathetic diseases, that they disappear under specific treatment, and, finally, that they do *not tend* to suppuration.

Rhachitis, though not an inherited disease, nor, strictly speaking, a diathetic one, yet is classed among the diathetic diseases. It presents

Great weakness, Anæmia,	Common to all diatheses.
Certain affections of the bones, Certain affections of the glandular system,	Peculiar to this disease alone.

The lymphatic glands are all enlarged in rhachitis, notably the spleen, and are affected, according to Jenner, with albuminoid degeneration, corresponding very closely to amyloid degeneration. The induration of the glands is not very marked, they being rather soft to the feel, and not tending to suppuration. These changes in the lymphatic system of course make themselves felt in the economy, but the effect is much less marked than in the other diatheses.

The alteration of the lymphatic glands in scrofula and tuberculosis is more marked and more important in children than in any

other diseases. An elaboration of these two diseases, with their pathology, would require more time than may be granted to one paper of an evening. No subject since the time of Bayle has been more extensively discussed, and in no subject has there been more conflict and fluctuation of opinion than in the matter of tubercle and scrofula. "Scrofula at one time posed as a tubercular process; tubercle at another has been described as a scrofulous process. Once more the two conditions have been quite distinct, and have even been antagonistic; and, lastly, they have been identical, with no line of separation between them. The very term tubercle has experienced a violent series of fluctuations. It has been applied to first one appearance and then to another; its limits have been terribly curtailed; vaunted specific features have one by one been removed, until it must be owned that the tubercle of to-day is but a poor, bald affair as compared with the tubercle of Laennec" ("Scrofula and Gland Diseases," Treves, p. 14). It can not be said that unanimity of opinion exists at the present day on the subject, though much light has been thrown upon it by modern observers. Strictly speaking, no accurate definition of either scrofula or tubercle can be made which shall be both clinically and pathologically correct. For these reasons I shall notice the gland changes in these two diseases under the one head, especially as they are to a large extent similar in both. Whether a lymph-gland is the subject of a deposition of tubercles or of strumous infiltration, its behavior in either case is usually the same. First, caseation takes place, then suppuration and breaking down follow, and the constitutional effects subsequent to these changes are the same in both —viz., absorption of the specific material and reproduction in other parts of the system of tubercle—gray or yellow—cheesy deposits, again breaking down of these new deposits, and finally phthisis. Indeed, the tendency of the two diseases to run into each other has often been noticed. Niemeyer states that "the danger to the strumous patient is that he may become tubercular." All authorities recognize the co-existence of the two diatheses—scrofula and tuberculosis—in the same person. In these two diatheses the superficial lymphatics are all enlarged, and can be felt under the finger in all exposed situations. The feeling of the glands is softer than in syphilis, and the tendency is to inflammation and suppuration; this is diagnostic of the affections, the grade of inflammation being low, and the tendency of the suppuration is to continue indefinitely.

The glands of the neck are the most frequently affected in struma

and tubercle, and all practitioners are acquainted with these troublesome abscesses which leave such unsightly scars. A peculiarity of these inflamed glands is the frequency with which the inflammation attacks the deeper seated glands, pus being formed deep down underneath a layer of glands which have not yet suppurated, so that, on making an opening for the discharge of pus, the incision is blocked up with a cheesy mass or plug (a gland not yet having undergone suppuration), which must be pulled or dissected out before there can be a free discharge of the matter. The inflammation is of a chronic character, and tends to involve one after another of the sets of glands, frequently extending deep down into the triangles of the neck and under the clavicles, and may produce serious local trouble. Another set of lymphatic glands affected in children in struma and tuberculosis are the tonsils. Chronic enlargement of the tonsils has long been noticed in children of a scrofulous or tubercular habit. The slightest causes serve to set up inflammation of the tonsils in this class of children, and the inflammation becomes chronic and enlargement follows. So intimate is the connection between tonsillar enlargement and tuberculosis that some writers have regarded hypertrophy of the tonsils as a cause of pulmonary tuberculosis; but these are doubtless cases of cause regarded as effect.

The *deep-seated* lymphatic glands which are most affected by scrofula and tuberculosis, and whose implication involves the most serious results by inducing consumption in its various forms, are the mesenteric and the bronchial glands. The terms marasmus, tabes mesenterica, consumption of the bowels, and mesenteric phthisis are indifferently applied to that form of scrofula or tuberculosis in which the glands of the mesentery are chiefly diseased by deposit, enlargement, and degeneration. The anatomical situation of the mesenteric glands renders their enlargement alone, if very great, of danger to the child. Lying close to the lacteals and thoracic duct, their pressure on these vessels may occasion difficulty of absorption of the chyle into the system, and wasting and atrophy of the patient may result from this cause alone. Sometimes the enlargement of these glands is so great that they may be felt through the abdominal wall. As the enlargement increases and the glands begin to soften and break down, chronic diarrhœa, chronic peritonitis, perforation, and agglutination of the bowels may take place, and the patient succumbs to these. In most cases of mesenteric phthisis, however, the fatal result is hastened or accomplished by the appearance of the disease in other parts of the body, usually in the lungs. The name bronchial

phthisis has been given to cases in which the bronchial glands have become infiltrated with scrofulous or tubercular deposit, and which in consequence caseate and break down. The name, however, is a misleading one, and was applied when these cases were believed to be due to tubercle alone, but, for want of a better, it has to be retained. Enlargement of the bronchial glands does not necessarily imply chronic lung disease, and cases occur in which the disease is limited to these glands and those of the mediastinum alone. These glands are situated at the bifurcation of the trachea, behind the upper bone of the sternum, and a little below it. They also accompany the bronchi into the interior of the lung, and, when swollen, produce the most serious consequences by pressure on the surrounding parts—blood-vessels, air-passages, and nerves. There is generally in these cases pressure on the large veins coming from the head, causing lividity and swelling of the head and face. The pressure on the nerves of the larynx gives rise to cough of a peculiar ring and stridor, like that of whooping-cough. Where the disease is confined to the glands, it may terminate in recovery by calcification of the glands; otherwise it may end by the rupture of the abscess into the pleural cavity, into the œsophagus, or into a bronchus, or by the erosion of a large blood-vessel, causing fatal hæmorrhage. When the gland simply softens and becomes converted into pus, hectic fever and general wasting set in, and a very common termination in this case is the production of acute general tuberculosis induced by absorption of the degenerated gland matter. The enlarged glands can usually be detected on percussion, giving dullness over the upper part of the sternum and on either side, while over the lung the percussion sounds are normal. Owing to the conduction of the sound by these solidified glands, auscultation over the apices of the lung and the supraspinous fossa will reveal breathing of a loud and cavernous character. A peculiar hum may be heard over the left second interspace, according to Eustace Smith, which is produced by pressure of the enlarged glands on the descending vena cava, or the left innominate vein. This author also states that one of the earliest indications of bronchial phthisis, noticeable long before the ordinary symptoms of pressure are manifest, is the venous hum heard when the patient's head is bent backward and the stethoscope is placed over the upper portion of the sternum. If the bronchial glands are at all enlarged, this position of the head tilts the trachea and the glands at its bifurcation up, and causes them to impinge upon the left innominate vein and to press it against the upper bone of the sternum as it passes behind

the bone. Bronchial phthisis in a majority of cases terminates in pulmonary phthisis. If it does not, the disease may last a great length of time, and, as the lungs escape involvement, the symptoms may prove exceedingly puzzling.

Two more glands require notice in conclusion. These are the retro-pharyngeal, two small glands lying in front of the spine, and upon the rectus capitis anticus major muscle. These glands are enlarged in common with all the others in scrofula and tuberculosis, and occasionally give rise, by their suppuration, to retro-pharyngeal abscess. This is dangerous to young children from its pressure on the windpipe, and sometimes terminates fatally. Certain lymphatics of the nasal fossæ enter into these glands, and retro-pharyngeal abscess may result therefore in consequence of disease of the nose (Fraenkel, "Diseases of the Nose," von Ziemssen's "Cyclopædia," vol. iv). All cases of abscess of this kind, however, that I have met with, have been in either strumous or tubercular children.

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